# Self-evaluation report for programme evaluation of Master's Programme in Toxicology

2024-02-15

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# The Assessment Panel's report for the programme evaluation of: Master's Programme in Toxicology

2024-06-24

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# Self-evaluation and Assessment Panel's report for the programme evaluation of the programme: Master's Programme in toxicology

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# Introduction

Self-evaluation

The programme's responsible parties, together with representatives from the faculty and students, should conduct a reflective self-evaluation by identifying strengths and areas for improvement in the programme. They should also describe and evaluate how these areas are addressed to ensure high-quality education. The focus of the self-evaluation should be on reflection rather than description. The self-evaluation should be supported with examples if possible. It should be based on the current status of the programme at the time of submission. The self-evaluation should be based on the four assessment areas listed below, which include ten assessment criteria.

**1. Preconditions**
1.1. Staff
1.2. Learning environment

**2. Design, implementation, and outcomes**
2.1. Goal attainment
2.2. Equal opportunities
2.3. Sustainable development
2.4. Follow-up, measures, and feedback

**3. Student perspective**
3.1. Student perspective

**4. Work-life and collaboration**
4.1. Work-life and collaboration
4.2. Internationalisation
4.3. Interprofessional competence

The self-evaluation should follow the provided headings. The headings, including the assessment criteria in the template, must not be removed. Subheadings may be added if necessary. The template's formatting, such as margins, must not be changed. The programme's text should consist of 1-3 pages per section, with font size 11 points and single spacing. The self-evaluation should provide the assessment panel with a comprehensive overview of the programme without including links to additional information. It should begin with a brief description of the programme's organisation, structure, and overall focus, with justification in relation to the degree regulations. The self-evaluation should also explain how long the education has been provided at KI. In the self-evaluation for the assessment criterion "Follow-up, measures, and feedback" and "Student perspective," an overall description at the KI level should also be included. This description is already prepared centrally by KI in this templet. The self-evaluation should conclude with the section "Other aspects," where the programme can describe relevant areas that are not included in any of the assessment criteria, such as other generic competencies and forward-looking developments to enhance the programme's quality.

The following attachments are to be included in the self-evaluation:

• Teacher table for teacher competence and capacity. The table should provide an overview of the main teacher competence and capacity for the programme. It is not necessary to report all teachers who teach. The teacher table is compiled in an Excel file that contains additional instructions.

• Mapping of the outcomes of a Master's degree to course learning outcomes, learning activities, and assessments. The mapping should provide an overview of which courses have learning outcomes related to the evaluated outcomes of a Master's degree. The mapping should also indicate which learning activities are used to support student learning to achieve the learning outcomes and how the learning outcomes are assessed. The mapping is compiled in an Excel file that contains additional instructions.
• Programme curriculum.
• Course syllabi for all courses included in the programme.
• Compilation of key figures regarding application numbers per place, number of students starting the programme, number of full-time equivalent students, and number of graduates.

The programme should compile the information in the teacher table and the mapping of outcomes for a Master's degree, while the programme curriculum, course syllabi, and key figures will be provided centrally by KI.

The academic advisor for the programme evaluation round, together with the coordinator for programme evaluations, should review that the programmes' submitted self-evaluations are complete before sending them to the assessment panel.

If necessary, the assessment panel may request additional supporting documents to ensure their assessment of the programme.

The self-evaluation should be approved by the committee responsible for the programme.

## The Assessment Panel's Report

The Assessment Panel is required to summarise their assessment in a report that is written in the same document as the self-evaluation. For each assessment criterion, the programme's strengths and areas for improvement, as well as the Assessment Panel´s assessment, should be described under separate headings. Under the "Strengths" heading, the Assessment Panel should highlight the programme's strengths within the assessment criterion and describe them briefly, preferably in bullet points. Under the "Areas for Improvement" heading, the Assessment Panel should identify areas that are deemed in need of improvement and describe them briefly, also preferably in bullet points. Under the "Assessment" heading, the Assessment Panel should explain their assessment and motivate their conclusions.

A summary of the Assessment Panel´s work should be described under the "Assessment Panel´s Summary" heading. It should begin with a reflection on the conditions that the self-evaluation provided for assessing the programme's quality, such as whether the self-evaluation was easy to read, well-structured, provided answers to the questions posed, and followed the instructions. The summary should also briefly summarise the programme's most important strengths and areas for improvement. The Assessment Panel may also include any additional comments they wish to convey.

Once the Assessment Panel´s report has been submitted, the self-evaluation and the report should be published on KI's staff portal.

# Self-evaluation

**Programme: Global Master's programme in toxicology**

**Degree: Master of Medical Science with a major in Toxicology**

## Description of the programme

The programme's organisation, structure, and overall focus will be outlined in this section, along with a justification in relation to the degree regulations.
The programmes should also explain how long the program has been provided at KI.
The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

The 2-year Global Master's programme in Toxicology (the ToxMaster programme) started at KI in 1976 and was given in Swedish with start every 2nd year. In 2010 it was developed into an international master programme given in English and from 2012 admitting paying students. From 2015 the ToxMaster programme has started every year admitting on average 25 students per year. The programme was initially started based on the needs of society. A very personal atmosphere was created by the founder and first Programme director Anders Bergendorff (1976-2003) which is still aimed for, as it contributes to a safe learning environment, facilitates networking and promotes students' input.

The ToxMaster aims at training students to become toxicologists working in public agencies or industry or as consultants in the area of safety assessment of different types of chemicals, such as pharmaceuticals, food additives and contaminants, pesticides, cosmetics, medical devices etc. It does not lead to a professional degree, however, the programme is still based on the needs of the society for professional toxicologists. Therefore, the curriculum is in accordance with the course requirements of the European Register of Toxicologists (ERT), which is a list of toxicologists who excel by high standards of education, skills and experience, and is coordinated by EUROTOX (European Societies of Toxicology). In addition, the ToxMaster aims at forming a suitable and valuable basis for further doctoral studies in the area of toxicology or life sciences.

#### Students

The students at the ToxMaster programme have different educational backgrounds (a bachelor's degree in biomedicine, biology, cellular and molecular biology, pharmaceutics, chemistry, medicine, nutrition, biotechnology, or the equivalent). Around 250-300 students apply to the programme each year with 124-153 applicants that are eligible (about 50% non-paying and 50% fee-paying). We have 20-30 students per year (based on years 2019-2023) with a composition of 11-21% from Sweden, 45-62% from EU/EES, and 24-43% from outside EU/EES (fee-paying students).

#### Organisation

The Institute of Environmental Medicine (IMM) and its Education Committee (UN-IMM) are responsible for the ToxMaster programme. The programme management consist of one Programme director (PD), two deputy PD, with expertise in the two major fields of toxicology, experimental toxicology and risk assessment, respectively,

as well as one programme officer (responsible for both programme and course administration and is also the programme study counsellor). There are ten course directors with responsibility for the eleven courses on the programme (see Figure 1). Ten courses are given by IMM and one course "*Laboratory Animal Science in theory and practice*" is given by Comparative Medicine, KI.

**Programme design**

The Master's Programme in Toxicology is quite unique worldwide in its two-year cohesive in the broad and interdisciplinary area of toxicology, where interaction between chemicals and the human body is the focus. Toxicology is currently in a transition phase, developing from the more traditional methods, such as animal testing and identification of adverse effects, towards non-animal methods and approaches, focusing on cellular and computational methods and knowledge about mechanisms of toxicity and Adverse Outcome Pathways (AOP). We include both the more traditional methods used for toxicity testing and risk assessment, but also the latest developments from science, methodology and chemical regulations. In addition, students learn how research and work in the field of toxicology contributes to sustainable development. In addition to the subject-specific courses on various areas of relevance to toxicology, the programme has a strong focus on generic skills. The programme puts a special emphasis on group dynamics and development, as well as giving the students opportunities to develop their own networks and prepare for their future careers. Ethics and sustainable development are additional areas that get much space in the programme in many courses.

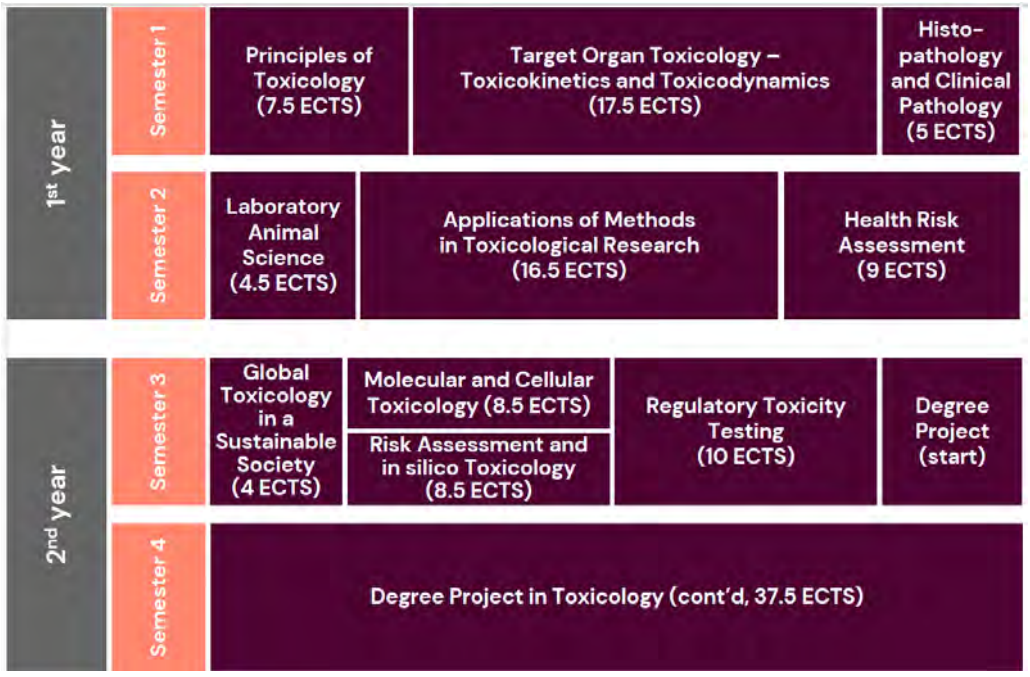


**Figure 1.** Outline of the courses within the ToxMaster programme.

The **first semester** (see Figure 1) is focused on introducing the students to toxicology during the course "*Principles of toxicology*". The second course "*Target organ toxicology – toxicokinetics and toxicodynamics*" is focusing on the mechanisms and effects from interactions of cells, tissues and different organs with chemicals and drugs. The first semester ends with the course "*Histopathology and clinical pathology*", where students learn principles and methods of pathology of relevance to toxicity testing in rodents.

In the **second semester** students learn both theoretically and practically relevant aspects of "*Laboratory Animal Science*". The "*Applications of methods in toxicological research*" course highlights methods and concepts for studying toxic effects. The students learn biostatistics and some methods used in research while doing lab work in small groups (2 students), analyse, present, and discuss their findings and write individually a lab report and conclude by learning about alternative (non-animal) methods and the process for validation and regulatory acceptance. The last course "*Health risk assessment*" focuses on the principles, methods, and applications of risk assessment in different legislations.

During the **third semester** students use their knowledge and skills and apply them in the courses "*Global toxicology in a sustainable society*" and "*Regulatory toxicity testing*", including aspects of toxicity testing using internationally harmonized protocols with a real-life example from drug discovery and development, the 3Rs (Replace, Reduce and Refine animal testing) and Quality assurance using Good Laboratory Practice. These courses put everything into the context of policy, ethics, and society, clearly incorporating a global sustainability perspective. In addition, students choose one of two tracks for more in-depth studies in "*Molecular and cellular toxicology*" or "*Risk assessment and in silico toxicology*".

Finally, in the **fourth semester** the course "*Degree project in toxicology*" (which is either 37.5 or 30 credits) is based on the interest of each student and may be a laboratory-based project in a research group, with direct or indirect relevance to toxicology, or a literature-based project in the risk assessment area.

**Pedagogic profile**

At the ToxMaster programme we have chosen to include a variety of different teaching activities to support the students' active learning process and contribute to each individual student's preferred learning style. The teaching is mainly campus-based, which was shown clearly preferred by both students and teachers in surveys after the pandemic. The students are early introduced to the student-activating and co-creative role in the learning process. In general, the theory of each area is introduced by lectures and/or digital material followed by individual or group assignments to get a deeper understanding and apply methods learnt with cases of relevance to the various areas of toxicology. Lectures illustrating examples of application are included for inspiration, in many cases presented by ToxMaster alumni, also facilitating the students' development of their networks and getting insight into the working life of toxicologists and researchers.

In the programme there are many group assignments. The students are encouraged to contribute with their different educational (and cultural) backgrounds and experiences in group activities. Group compositions are changed between tasks, to help students get to know each other, and learn to collaborate with others, with different educational and cultural backgrounds, personalities, and communication styles, and that have other experiences and perspectives. To promote good conditions for learning, as well as to promote equal opportunities for learning, we have several activities to establish a safe environment (psychological safety) for students to present ideas, ask questions and admit mistakes. The group activities are also combined with training in self-awareness and group dynamics to develop the students' skills in working together and developing efficient and healthy teams.

Toxicology is a multidisciplinary subject where the toxicologist needs to, besides having in depth skills in the core areas also, have basic skills in many areas of relevance

to toxicology and experience in how to collaborate with experts in the different fields. Some courses include teaching activities where students are collaborating with students in other areas to promote their interprofessional skills. In the ToxMaster programme group work and group presentations (oral, written) are used only as teaching and learning activities and for formative assessment. All examinations and grading are based on individual achievements, such as written exams, reports, reflections and oral presentations.

### Revision of the programme curriculum and syllabus

The current programme curriculum was implemented in 2015, involving a major revision of the content and order of the courses. In 2022 a process to revise the current curriculum started in the light of future needs, students' interests and available teachers' competence. A new programme syllabus is planned to be implemented in autumn 2026 when the current PD retires. The analyses and results of the current programme evaluation will be a valuable contribution to the design of the new curriculum.

# 1 Assessment area: Preconditions

## 1.1 Assessment criterion Staff

In their education, students should receive high-quality teaching, which requires that the teachers collectively possess the necessary scientific/professional competence. However, teachers must also have pedagogical competence to support student learning. Furthermore, it is important that the teaching capacity is proportional to the scope of the programme, including teaching and assessment. A high-quality teaching resource is characterised by a stable supply of teachers. The department or committee responsible for the programme is responsible for designing and following up on course assignments for each course and allocating the assignments so that the programme's courses are conducted by the department that is best equipped to carry out the assignment with high quality, including strong research connection. The course responsible department is responsible, amongst other things, for staffing the department's courses in accordance with the course assignment and for developing, promoting, and ensuring the teachers' subject competence, research connection, and pedagogical ability. The programme, in collaboration with the course responsible departments, should therefore work long-term on both continuity and competence development among teachers in the specific programme, and there should also be strategies for how staff turnover is managed, for example, in the case of retirements. For a programme leading to a professional qualification, it is important that students have access to supervisors with adequate competence during practice-integrated learning, in order to provide students with high-quality education.

**Assessment criterion - Staff**
The number of teachers and their combined expertise (scientific, professional, and pedagogical) is adequate and proportional to the volume, content, and implementation of the education in both the short and long term.

Describe, analyse, and evaluate. Describe strengths and challenges, as well as how they are addressed to ensure high quality in the programme. Illustrate with examples. Refer to the completed and attached teacher table. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

**Teachers in the programme**

The ToxMaster programme has ten course directors for the eleven courses. It can be seen from the “Teacher table” attached that the course directors (marked with yellow) are the ones that teach the most. They not only teach on their own course, but also on other courses, contributing to keeping the programme together. In addition, there are other teachers from IMM, KI and outside of KI, who teach a few hours each year but contribute with important specific scientific and professional competence. These “critical” teachers are also listed in the table. Not listed in the table are the supervisors for the master projects. The students perform their master project in a research group, at IMM, other departments at KI, or other universities in Sweden or abroad. Some students chose to do their projects at a company, a public agency or a research institute. The supervisors of the master projects, who have a PhD or are senior toxicologists, bring in specific scientific and professional expertise. All students who perform a project outside KI also have a supervisor at IMM.

**Scientific competence**
All course directors have a high scientific competence, one is a professor, eight are docents and one has a PhD. All are active researchers in different fields of toxicology. The other main teachers at IMM and KI all have a PhD and 30% are docents. PhD students and postdocs participate to some extent in teaching mainly as tutors in group assignments. The few teachers from other universities also have a PhD or are docents. Most course directors and other teachers spend most of their time on research. Additional aspects of scientific competence focusing on research related education are described in the section "**Learning environment**".

**Professional competence**
Most course directors are toxicologists with a broad competence in the toxicological field, as well as specialised competence in their field of research, such as risk assessment methodology, endocrine disruptors, reproductive toxicology, environmental pollutants, genotoxicity, mixture toxicity, air pollution, particle toxicity, metal toxicity, in vitro methods, new approach methodologies, adverse outcome pathways, epidemiology, biomarkers of exposure and effect, biotransformation, zebrafish models, aryl hydrocarbon receptor, barrier organ toxicity and toxicokinetics.

IMM has a governmental obligation to support national agencies in the area of risk assessment and environmental medicine, where a major part is health effects of chemical exposure (i.e. toxicology). One of the course directors is deputy head of the department with specific responsibility for these applied activities. Many other course directors are also involved in risk assessment related tasks for the Swedish Chemical Agency, Swedish Food Agency, European Commission agencies, WHO etc.

External teachers from other departments of KI, other universities or organizations are bringing their specific professional competence needed for the programme. Experts from RISE (Research Institutes of Sweden) contribute with critical expertise within the fields of regulatory toxicity testing, animal studies with focus on refinement and reduction, safety in drug discovery and development, pathology, bioanalysis, toxicokinetics, computational toxicology and quality assurance. Teachers from Stockholm University and Uppsala University are teaching presentation skills and ethics, respectively. Teachers from KI Academic writing support are critical for teaching academic writing, including popular science and referencing.

**Pedagogical competence**
All course directors have a high pedagogical competence. 60% of them have full formal pedagogical competence, i.e. 10 weeks of higher education pedagogical courses according to SUHF:s requirements. The others have taken 5-8 weeks of courses and made plans for taking the rest of the courses which are followed up annually by the department. All course directors have performed significant pedagogical development projects of their courses including use of digital tools, such as Mentimeter, Padlet, recorded lectures, videos, quizzes and peer review in the learning platform Canvas. The lab training has been developed to follow the research process and using original data and allowing the students to design their experiments. Further developments include sustainable development with active engagement of students, integration of group dynamics preparing for group activities.
The course directors and other teachers at IMM participate in the biannual IMM teacher days that recently have addressed equal opportunities, sustainable development, examinations, digital teaching and generative AI. IMM teachers have presented experiences from their teaching and invited guests from the KI library's

Academic writing support, the KI unit for teaching and learning (UoL) and experts on equal opportunities to lead workshops. IMM has a Canvas page for teachers where we collect the documentation from the teacher days and where everyone can share examples from their teaching. The course directors meet at least once each semester to reflect on their courses and to discuss further pedagogical development work.

**Strategic competence supply and recruitment**
A working group appointed by the Head of department including the Departmental director of education (GUA), has, during the autumn semester 2023, inventoried the current teacher positions at IMM and investigated the need for teacher positions and produced a proposal for the need for recruitment to teacher positions (including senior lecturers and professors) in a 5-year and 10-year term for the needs of education and research at IMM. The working group reported to the head of department in December 2023. There is a need for the recruitment of a professor as Programme director within the next five years as the current Programme director will retire. The aim is also that all course directors in the programme have a position at least as senior lecturer. The programme management is also actively engaged in the strategic competence supply and recruitment as demonstrated in the yearly Quality plans for the programme that have included the following actions: Teaching agreement with RISE (current 2023-2026), Increase incentives of teaching engagement and Formal teacher positions for all course directors.

**Analysis and evaluation**
All course directors are very engaged, have a solid background in toxicology (most are ToxMaster alumni), teach a lot, have good scientific competence and pedagogic skills and continuously improve their courses. There is a broad range of internal and external teachers contributing with their respective expertise of relevance to the students.

There is an inherent problem to combine research and education on the individual level. In order to achieve a successful career at KI you need to spend a lot of time on research and to improve your scientific merits. You need to work hard to become a docent and to get external research funding, which in turn forces you to be more active to gain research results and to publish to be able to get further funding.

Educational merits are required to become a docent and to achieve higher positions but are not compensated financially to cover more than the time the teachers spend with the students. Any revision of teaching and courses, improvements regarding pedagogy and taking further teaching courses is not funded. This means that teachers that need merits for becoming a docent and getting positions as senior lecturer and professor have clear incentives to contribute to teaching. But when these titles or positions are achieved there are no longer any external incentives to engage in teaching. The programme needs teachers and course directors that are engaged and spend time developing their teaching and their courses, but we can see that they then risk their research merits. To keep and develop the quality of the ToxMaster programme it is of critical importance to keep these engaged course directors and support their efforts in balancing their teaching with their research career.

In addition, as the ToxMaster aims to contribute to the societal needs of toxicologists, the programme needs to be broad and cover the areas within toxicology that are needed for the students' future working life. Much of this competence is covered by the teachers at IMM, but there are certain areas of relevance and importance that are not covered within KI. Important examples of the need for external teachers include

regulatory toxicity testing in vivo and drug discovery and development. Since AstraZeneca's close-down of its safety department in Södertälje in 2012 the programme has continued to collaborate with these toxicologists, but now through RISE (Research Institutes of Sweden). This collaboration has been possible through teaching agreements for two or three years at a time. However, to base mandatory courses on external teachers is both difficult and vulnerable on a long-term basis. This area also links to the current lack of teachers with experience in animal testing as such methods are no longer used in toxicological research to the extent it was some decades ago. However, toxicity testing in animals is still a regulatory requirement for most product types, which means that toxicologists need both theoretical knowledge and practical experience in animal testing.

**Strengths**

- Course directors have a very high scientific, professional and pedagogical competence.
- Currently the number of teachers with relevant competence is sufficient.
- IMM actively supports pedagogical development and has made a plan for strategic competence supply and recruitment.

**Challenges**

- Course directors are struggling with finding a balance between major teaching obligations and their research career. IMM supports the course directors with some KI funding for research connection but additional funding for researchers with major teaching obligations would be needed at university level.
- Higher education pedagogical courses are required to develop pedagogical competence, but it is difficult for teachers to prioritize attending the courses, and in some cases the availability or the quality of the courses could be improved. IMM is supporting the teachers in identifying relevant courses and follows up and reports back to the KI Committee for higher education the need for sufficient number of high-quality courses.
- In the long-term perspective the availability of competent teachers covering the broad areas of toxicology is a major challenge in the light of retirements, risk of course directors leaving the programme or IMM, as well as the vulnerability of relying on external teachers for some areas. The programme management is closely following the situation and IMM management has made a plan for strategic competence supply and recruitment, but the challenge remains.

## Assessment panel's evaluation

**Instruction**

For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:

**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.

**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.

**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.*

**Strengths**

- Course directors have a very high scientific, professional, and pedagogical competence.
- Currently the number of teachers with relevant competence is sufficient.
- IMM actively supports pedagogical development and has planned for strategic competence supply and recruitment.

**Areas for improvement:**

- Course directors are struggling with finding a balance between major teaching obligations and their research career. Comment: This is not unique for the ToxMaster programme – many, especially senior lecturers, have this dilemma to deal with, for example at the faculty of Pharmacy, UU. To improve this challenge additional funding for researchers with major teaching obligations would therefore be needed.
- Higher education pedagogical courses are required to develop pedagogical competence, but it is difficult for teachers to prioritize attending the courses, and in some cases the availability or the quality of the courses could be improved. Comment: It is worth noting that most teachers mentioned in the Excel file “Lärarkapacitet och Lärarkompetens för ToxMasterprogrammet” have either formal or real pedagogical competence, but as many as 20% of the name given teachers lack such competence. During the interviews it became clear how the program and course leaders defined the difference between formal- and real pedagogical competence. To improve this challenge: Provide support to the teachers in identifying relevant high-quality courses and follows up and reports back to the KI Committee for higher education the need for sufficient number of high-quality courses.
- In the long-term perspective, the availability of competent teachers covering the broad areas of toxicology is a major challenge in the light of retirements, risk of course directors leaving the program or IMM, as well as the vulnerability of relying on external teachers for some areas. It appears as if the program is highly dependent on relatively few teachers, spending > 50% of their working hours on teaching/teaching activities. As many as 40% of the name given

persons in the Excel file, spend less than 1 % of their working hours on teaching. To improve this challenge – see bullet 1.
- Investigate the possibility of a long-term collaboration with authorities that employ toxicologists.

**Evaluation:**
Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is the above-mentioned strengths, but also the fact that the program has already started a strategic planning evaluating the need for teacher positions at IMM (including senior lecturers and professors) in a 5-year and 10-year term. The MasterTox programme is also preparing for the fact that there will be a need for the recruitment of a professor as Program director within the next five years as the current Program director will retire. This was also confirmed during the interviews.

## 1.2 Assessment criterion - Learning Environment

The learning environment refers to the environment in which the education takes place and where students and teachers operate. A good learning environment is characterised by creativity and conditions for development, as well as a close connection between research and education. Guiding principles for KI's research-related education at first and second cycle are as follows: 1) students are involved in ongoing research, which means that they gain knowledge about ongoing research in both theoretical and practical contexts, and have the opportunity to participate in it during their education, 2) teachers are research-active and convey a scientific approach through appropriate pedagogical methods, 3) the main field and content of the education is grounded in scientific methods and updated research findings, and active research is conducted within the relevant field at the university and 4) the teaching is based on research in teaching and learning and is built on learning activities that contribute to the student's ability to understand, evaluate, and utilize the processes through which scientifically based knowledge is generated and constantly reassessed (the research process). For a programme leading to a professional qualification, it is also important that students have access to a suitable practice-integrated learning environment.

**Assessment criterion - Learning Environment**
There is a scientific and profession-oriented environment for the education, and the activities are conducted in a way that establishes a close connection between research and education.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

**Research environment**

The connection between research and education, according to the four principles for KI's research-related education, is an important aspect of the learning environment at the ToxMaster programme.

**Students are involved in ongoing research**
Students learn about and are involved in ongoing research in both theoretical and practical parts of the courses. For example, during the course "*Applications of methods in toxicological research*" (aka the lab course) the students perform a small research project over 5 weeks where they study the toxic mechanisms of nanoparticles in human lung cells by applying several experimental methods. These projects are linked to ongoing research of the teachers involved and often explore aspects that are not well-investigated thus contribute to new data. The practical lab work is performed in the research laboratories at IMM, and tutors are PhD students and postdocs. During the master project most students perform their projects in research groups and take part in their ongoing research, often co-supervised by PhD students or postdocs with a more senior researcher as the main supervisor. In addition, the Bergendorff scholarship allows students at the programme to apply for support to perform an extracurricular internship research project in toxicology at IMM for two months during the summer between the first and second year. In a theoretical context, all courses include journal clubs or literature assignments that relate to recent or ongoing research and development.

**Teachers are research-active and convey a scientific approach through appropriate pedagogical methods**
Almost all teachers are active researchers. The course directors all have several weeks of higher education pedagogical courses, as well as extensive experience in developing their courses in line with current theories of learning. Considerable efforts are made to promote psychological safety and develop the students' skills in self-awareness and group dynamics. This is in accordance with KI pedagogical policy. Course directors and other teachers regularly discuss teaching activities and share experiences at the ToxMaster course director meetings and the IMM teacher days.

**The content of the education is grounded in scientific methods and updated research findings, and active research is conducted within the relevant field at the university**
All areas of toxicology are research-active, including mechanisms of toxicity, testing approaches, and risk assessment methods, and the teaching involves the latest research findings and research methods of relevance to toxicology. Toxicology is currently in a transition phase where new methodology based on non-animal models and mechanisms of toxicity is developed. Students learn the principles, including strengths and limitations, of these methods and how they can be applied. Lectures that introduce different areas and illustrate applications, of for example, different methods often include examples from recent research.

**The teaching is based on research in teaching and learning**
The course leaders organize the teaching and learning activities mainly according to student-activating methods, such as Problem-based learning and other group assignments, seminars, workshops, individual and group projects. Teaching activities are usually a mix of different student-activating methods. Lectures are often combined with shorter activating parts, such as bee-hive discussions or Mentimeter questions. The mix of different teaching activities also contributes to the learning process of all students that may have different learning styles and preferences.

**Professional environment:**
Besides competence in research and pedagogy, many teachers are trained toxicologists and some are active within risk assessment. Many teachers are contributing with their expertise to expert groups, nationally and internationally and thereby keep updated also on more applied methods and developments, experience which they share with students. In addition, in many courses there are external teachers from outside academia, where students can get a broader perspective in addition to the specific subjects taught. At the Degree project course students are encouraged to choose a project within their own interest. This means that some students perform their master project at a governmental agency or at a company.

**Teaching rooms**
The teaching on the ToxMaster programme is mainly Campus-based. Campus teaching facilitates the relationship between students and with the teachers, makes it easier for the students to focus on their studies, ask questions and discuss with peers and teachers. It thereby increases the quality of students' learning.

**Digital teaching methods**
Campus-based teaching is complemented with digital teaching methods, such as Zoom lectures and Q&A-sessions before exams. In some courses films are available at the learning platform Canvas to support flipped classroom methodology. Interactive tools, such as Menti and Padlet are used in many lectures and at the beginning of courses, or as evaluation of teaching activities. Hybrid teaching is mainly used at the monthly meetings with students in the Degree project course, where also students far away from KI can participate actively.

**Exit poll**
The results from the Exit poll in 2023 are shown in Table 1.

**Table 1.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| The education's content was based on current research | 5.3* | 5.3 |
| I learnt about ongoing research during:<br>**Theoretical learning activities** | 5.2 | 4.9 |
| **Practical and/or clinical learning activities** | 4.4 | 4.5 |
| The **physical study environment** has worked well for my needs on the whole | 5.5 | 5.3 |
| The **digital learning environment** has worked well for my needs on the whole | 5.5 | 5.1 |
| A **variety of teaching methods** were used during the education in a way which encouraged me to be active in my learning | 5.3 | 4.9 |
| I feel well-prepared for my future role's requirements to: apply research-based evidence in my work | 5.4 | 5.3 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

The graduating ToxMaster students (23/29 answers, 79%) were pleased with the learning environment and connection to research in their education. In the exit poll some students commented: "*Opportunity to meet research groups and network*", "*The*

*best experience was the teaching methodologies used such as problem based learning*" and "*The study environment was amazing and very multicultural which I liked. I also liked how everything was very student centric and the teachers had open discussions with the students. The research focus also was very important and stimulating"*

**Analysis and evaluation**
The ToxMaster programme is closely connected to research through students being involved in ongoing research, teachers being research-active, and both the content and the teaching and learning activities are regularly updated based on the latest research. Students confirm this in the Exit poll. Students are also pleased with the current learning environment, which is mainly Campus-based, but with digital parts and study visits outside Campus.

A major disadvantage with the large extent of Campus teaching is, however, the high and increasing cost of renting the teaching rooms. This is also the case for the lab course when the students perform wet labs at IMM. The "*Lab course*" is very valuable for the students since they get lab experience and contact with ongoing research, as well as contact with researchers. It is, however, challenging for the course directors to host the students in the IMM research labs during several weeks. In addition, even though the programme contributes to the rental cost of lab space, availability for the course remains an issue. The programme has considered the teaching labs at KI, but they are too big, too expensive and do not have the equipment required for the labs included in this course. This situation may lead to less teaching on campus, the introduction of more online teaching and more digital activities. Flipped classroom activities could still be of high quality for learning, but resources are needed to develop the pedagogy and the teaching material.

So far, the teaching collaboration with RISE has been very successful and is appreciated by both parties.

**Strengths**
- Students are pleased with the learning environment and the connections to research.
- The programme constitutes a research-related education according to all four KI Guiding principles.
- Currently a good mix of campus-teaching, digital activities and visits outside KI.

**Challenges**
- Cost of facilities. The high and increased cost of teaching rooms and facilities is a considerable challenge. This cost is causing a reduced share of the course budget available to funding of teachers.
- Long-term perspective: Uncertain if students will have access to the RISE toxicity testing facility. Programme management regularly discuss teaching agreements with the RISE colleagues and try to find advantages of collaboration for both parties.
- Long-term perspective: Uncertain if students will be able to perform wet labs at IMM. Programme management regularly discusses with IMM researchers and head of department and try to find advantages of collaboration for both parties.

## Assessment panel's evaluation

**Instruction**

For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:

**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.

**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.

**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet*.

**Strengths**

- Students are pleased with the learning environment and the connections to research. Questions about the learning environment in the ToxMaster Exit Poll 2023 was rated above 5 by the students and was generally rated higher than the average result of KI International master programs (except for the question about practical/clinical learning activities, which the ToxMaster students rated 4.4).
- The program constitutes a research-related education according to all four KI Guiding principles.
- Currently a good mix of campus-teaching, digital activities, and visits outside KI.

**Areas for improvement:**

- Cost of facilities. The high and increased cost of teaching rooms and facilities is a considerable challenge. This cost is causing a reduced share of the course budget available to funding of teachers. This challenge is not unique for the ToxMaster program. Solution? Ask the state why Akademiska Hus must make a profit each year (assuming that KI is renting from this organization)?
- Long-term perspective: Uncertain if students will have access to the RISE toxicity testing facility. This is indeed an important issue, but the program management is apparently discussing teaching agreements with the RISE colleagues to find advantages of collaboration for both parties.
- Long-term perspective: Uncertain if future students will be able to perform wet labs at IMM to the same extent as today. We believe that a master program in toxicology must include wet labs, so if the program fails to convince IMM researchers and the head of department about the necessity of wet labs in house – the future for the MasterTox program will probably be jeopardized. During the interviews, students emphasized the importance of practical laboratory training.

**Evaluation:**

Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is that the program obviously constitutes a research-related education, following all four KI

Guiding principles. The learning environment is also ranked highly by the students.

# 2. Assessment area: Design, implementation and outcomes

## 2.1 Assessment criterion Goal attainment

For each degree, there are a number of formulated qualitative targets (outcomes for the degree) in the System of Qualifications (Appendix 2 to the Higher Education Ordinance). In addition to the national outcomes, programmes may also have local outcomes, which are described in the programme's curriculum. In order to delimit the scope of the evaluation, KI makes a selection of outcomes prior to each programme evaluation. The principle of selection is that at least one outcome per form of knowledge is included in the selection. For programmes that provide both a general qualification and a professional qualification, at least one outcome from each degree must be included. For programmes with local outcomes, at least one local outcome must be included. The total number of outcomes chosen should not exceed six.

The qualitative targets (outcomes for the degree) define what the student should have achieved when the degree is issued. The programme must describe how the education ensures that the student is given the opportunity to achieve the outcomes when the degree is issued. Such a report may include, for example, the nature of the progression, the link between outcomes for the degree, intended learning outcomes in course syllabi, learning activities and assessments, grading criteria and how they are used, appropriate teaching methods and activities and the way in which student learning is promoted, and how the student's conditions and needs are considered.

## Assessment criterion: Goal fulfilment, the form of knowledge and understanding

**Assessment criterion for Goal Fulfilment – Knowledge and understanding**
Through design and implementation, the programme enables, and ensures through assessment, that the student, when the degree is issued, can achieve the selected outcomes within the knowledge form knowledge and understanding in the system of qualifications.

**Target**
For a Degree of Master (120 credits) the student shall demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

From the attached document mapping degree outcomes and courses' intended learning outcomes (ILOs) it became clear that most courses include at least one ILO matching the national degree outcome "***demonstrate knowledge and understanding***

***in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work***". The areas of knowledge and understanding required for a toxicologist constitute a broad range of subjects and methods which are reflected in the 10 courses of the programme. In some areas a toxicologist needs specialised knowledge and examples of such areas are: toxicological research methods, toxicity testing and risk assessment. These areas are taught at several levels during the programme, from introductory principles in the first course to get an overview, through applications in later courses and finally in-depth knowledge on the topic of the master project. Other areas of importance to toxicology are covered less extensively. Here the aim is that the students learn about the principles, methods, applications and terminology on a more basic level to facilitate collaboration with experts in these fields. Examples of such areas are: pathology, toxicokinetics, bioanalysis, in silico toxicology etc. Students get insight into current research in many courses, such as "*Applications of methods in toxicological research*". Current development work is included in the courses "*Health risk assessment*", "*Global toxicology in a sustainable society*" and "*Regulatory toxicity testing*". The examinations of these course outcomes mainly constitute of written exams, but also written assignments/reports and oral presentations are used. The teaching activities chosen to support the learning of the students are mainly student-oriented and with active learning, such as Problem Based Learning and other group assignments, seminars, workshops, individual and group exercises and assignments, as well as the individual master thesis project commonly performed within a research group. Lectures are used in most courses to introduce new areas, but to a relatively limited extent.

To describe goal attainment in more detail three examples of intended learning objectives are given in Table 2. Regarding "**broad knowledge**" the objective "*Describe and explain central concepts of toxicity and the underlying mechanisms*" is taught in the course "*Target organ toxicology*" using Problem-Based Learning where the students work in groups to understand the problem, brainstorm about what could be of relevance to the problem and what they need to study. They work individually and meet with their group for further discussions. In this course there are several problems focusing on different target organs for toxicity. All are presented orally and discussed with a tutor and some problems are also presented by a written report. The examination is written module exams to assess important knowledge and understanding.

The example on "**specialized knowledge**" is from the "*Degree project in toxicology*" course with the ILO "*Demonstrate deep knowledge and understanding in the area of study and related toxicological field*". Students work on their own master project with project-specific supervisor(s). Their specialized knowledge is examined by a written thesis, and oral presentation with discussion, where both students and a teacher act as opponents. The assessment by the supervisor(s) is also part of the examination. The assessment criteria for the written report (pass level) is "Important aspects of the specific area of study as well as the related toxicological field are included in the report and correctly described using relevant concepts and terms".

For the last part of this degree outcome "**insight into current research and development work**" the example is from two parallel elective courses during the 3rd semester where the students can choose to specialize in "*Molecular and cellular toxicology*" or in "*Risk assessment and in silico toxicology*". The ILO in this example is "*Explain recent advances within research and development of methodologies in molecular and cellular toxicology or risk assessment and in silico toxicology*". In these

courses the learning activities are journal clubs to stimulate deeper learning and aspects of research and development are discussed with tutors and examined either via individual oral presentations and discussions or via a written reflection, respectively for the two courses.

**Table 2**. Examples of courses' intended learning outcomes that match specific parts of the degree outcome and how the ILOs are taught and examined.

| **Part of the degree outcome** | **Matching ILO** | **Teaching and learning activity** | **Examination** |
|---|---|---|---|
| broad knowledge | Describe and explain central concepts of toxicity and the underlying mechanisms (1st semester) | Problem-Based Learning, additional lectures | Written module exams |
| specialised knowledge | Demonstrate deep knowledge and understanding in the area of study and related toxicological field (4th semester) | Project work with project-specific supervisor(s) | Written thesis, oral presentation and discussion. Also assessed by the supervisor. |
| insight into current research and development work | Explain recent advances within research and development of methodologies in *molecular and cellular toxicology*[1] or *risk assessment and in silico toxicology*[2] (3rd semester) | Journal club including discussions and presentations | Examined by oral presentation and discussion[1] or written reflection[2] |

[1, 2] Refer to two parallel and elective courses where the student chooses one of them.

**Exit poll**

In the Exit poll from 2023 the graduating ToxMaster students felt well-prepared to keep up with knowledge development within their field (average 5.1 of maximally 6, which means "to a very high degree"). The average score for the KI international master programmes was 5.0.

**Analysis and evaluation**

The courses within the programme cover the areas of knowledge needed to become a professional toxicologist and also research-based courses to form the basis to continue as a doctoral student. The courses build upon each other with a clear progression, starting with introductory activities for the different subjects, continuing with more theoretical and practical aspects and at the end of the programme the various subjects and methods are applied and integrated in for example more specialized in the courses "*Regulatory toxicity testing*" and "*Degree project in toxicology*".

The teaching activities vary and become increasingly individual and advanced in later semesters. When the ILOs were analysed towards the degree outcome it became clear that the progression included in the courses throughout the programme can be seen in the ILOs. For example, in the two first courses of the programme the objectives include terms as "basic" and "central" concepts and phenomena, whereas in the second year ILOs include more advanced terms, such as "recent advances within research and development", "deep knowledge and understanding", "demonstrate

specialized methodological knowledge and understanding in the area of study" and "identify needs for further knowledge, research and development within the area of study". The progression is not clear enough in some ILOs. Thus, in coming revisions of the course syllabi this will be clarified using terms as in the programme outcome, such as "specialised knowledge" and "insight into current research and development work".

**Strengths**

- The students achieve both broad and deep knowledge and understanding and feel well-prepared to keep up with knowledge development in toxicology.
- The ILOs are taught and examined in accordance with constructive alignment and progress throughout the programme.

**Challenges**

- Progression is not very clear in the Intended Learning Objectives. These will be revised in the coming regular revisions of the course syllabi (reviewed every semester).

## Assessment panel's evaluation

| **Instruction** |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.* |
| **Strengths**<br>• The students obviously achieve both broad and deep knowledge and understanding and feel well-prepared to keep up with knowledge development in toxicology.<br>• The ILOs (intended learning outcomes) are taught and examined in accordance with constructive alignment and progress throughout the program.<br>• The ILOs include lectures and problem-based learning (to address broad knowledge), project work with project-specific supervisors (to address specialized knowledge) and journal clubs including discussions and presentations (to address insight into current research and developmental work).<br><br>**Areas for improvement:**<br>• The program is aware of the fact that progression is not very clear in the ILOs. These will therefore be revised in the coming regular revisions of the course syllabi (apparently reviewed every semester). |

- Clarify the importance of language skills for different types of employment.

**Evaluation:**
Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is that the students obviously achieve both broad and deep knowledge and understanding and feel well-prepared to keep up with knowledge development in toxicology. This was also confirmed during the interviews and indicated in the Exit Poll 2023, where the student ranked questions about this issue high (average 5.1 of maximally 6).

## Assessment criterion: goal fulfilment, the form of knowledge competence and skills

**Assessment criterion: Achievement of objectives – competence and skills**
Through design and implementation, the programme enables, and ensures through assessment, that the student, when the degree is issued, can achieve the selected outcomes within the knowledge form of competence and skills in the System of Qualifications.

**Target**
Degree of Master (120 credits) the student shall demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

In the attached document mapping degree outcomes and ILOs it is clear that several courses include at least one objective that match a part of the very complex outcome "***demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work***".

To describe goal attainment for this outcome it is broken down into smaller parts (Table 3). Most of these parts are covered by ILOs in the degree project course where the teaching activity is the master project performed in a research group or outside academia.

The examination differs slightly for the different parts of the ILO but all are examined by the written thesis and most of them also by oral presentation and discussion. For the part "… **within predetermined time frames** ..." the supervisor is also part of the examination process. For the part "...**to plan and, using appropriate methods**..." this is also covered by the ILO "*plan laboratory experiments that can be used to answer*

*cellular and molecular toxicological issues*" in a course on the 2nd semester "*Applications of methods in toxicological research*". The teaching activities include lectures and practical labs, examined by individual lab reports, where students discuss the study design and methodology used, and a written exam where students are asked about aspects related to planning and methodology. Finally, for the part "… **contribute to the formation of knowledge** …" there is an ILO "*reflect on the complexity of toxicology when interpreting results and drawing conclusions in toxicity studies of chemical substances*" in the course "*Regulatory toxicity testing*" on the 3rd semester where students together write a joint toxicity report (based on raw data from a real study) and draw conclusions which are discussed in class with teachers. This ILO is examined through a written exam where students reflect on the process of integrating results to draw conclusions from the study.

**Table 3**. Examples of courses' intended learning outcomes that match parts of the degree outcome and how they are taught and examined.

| **Programme outcome** | **Matching ILO** | **Teaching and learning activity** | **Examination** |
|---|---|---|---|
| *Demonstrate the ability to identify and formulate issues critically, autonomously and creatively* | "demonstrate the ability to independently, critically and creatively integrate knowledge and analyse and deal with complex issues related to the area of study" (4th semester) | Project work with project-specific supervisor(s) | Written thesis, oral presentation, discussion. Assessed also by the supervisor. |
| *as well as to plan and,* | "plan laboratory experiments that can be used to answer cellular and molecular toxicological issues" (2nd semester) | Lectures and practical lab work | Individual lab reports, written exam |
| *using appropriate methods, undertake advanced tasks* | "apply adequate methods to solve a stated scientific issue" (4th semester) | Project work with project-specific supervisor(s) | Written thesis. Assessed also by the supervisor |
| *within predetermined time frames and so* | "show a professional approach regarding planning of tasks within the chosen project, time planning and collegial cooperation" (4th sem.) | Project work with project-specific supervisor(s) | Assessed by the supervisor |
| *contribute to the formation of knowledge* | "reflect on the complexity of toxicology when interpreting results and drawing conclusions in toxicity studies of chemical substances" (3rd semester) | Writing a joint report with conclusions, discussions | Written exam |
| *as well as the ability to evaluate this work* | "evaluate the relevance of his or her own project in a broader scientific and societal perspective" (4th semester) | Project work with project-specific supervisor(s) | Written thesis, oral presentation, discussion |

Regarding progression, all parts are taught in courses during semesters 1-3, by limited tasks and often discussions in groups. In the final degree project course students individually are examined on all parts of the outcome through several ILOs.

**Exit poll**
The following results from the Exit poll from 2023 show that the graduating ToxMaster students were pleased and felt well-prepared for aspects relating to this outcome, for example regarding independence and critical review (Table 4).

**Table 4.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| The structure of the education encouraged independence in my learning. | 5.4* | 5.1 |
| I feel well-prepared for my future role's requirements to:<br>critically review information | 5.4 | 5.3 |
| work independently | 5.4 | 5.4 |
| search for necessary information | 5.5 | 5.3 |
| solve problems independently | 5.3 | 5.1 |
| being able to use scientific methods | 5.3 | 5.1 |
| apply practical skills | 4.9 | 4.8 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

**Analysis and evaluation**
There are many courses where students practice the different parts of the degree outcome with progression and the degree project at the end of the programme covers most parts of the outcome. Students are pleased and feel well-prepared within the aspects of this national outcome when they graduate.

How to examine the part of this degree outcome "… undertake advanced tasks within predetermined time frames …" has been discussed during the evaluation process. As students can always do re-takes if they do not meet the given deadline for submission of an exam it is not clear how this part of the outcome can be examined. The students, however, must eventually meet a deadline for all examinations in order to pass the courses. During many courses, for example the course "*Target organ toxicology*" on the 1st semester, there is a given structure that supports the students to be able to plan their work to be able to succeed in submitting their tasks within the predetermined time frames. In the course "*Regulatory toxicity testing*" on the 3rd semester student groups themselves plan their advanced tasks in order to submit their final reports in time. This is a challenging task for the students, where they have considerable freedom to plan themselves, but they need to agree within their groups, for example on their own deadlines. So far there are no ILOs for this part of the outcome before the final Degree project course. In the development of the new curriculum ILOs will be clearer regarding progression and relation to this degree outcome.

**Strengths**
- There are many ILOs in courses where students practice the different parts of the outcome with progression and finally, the degree project covers most parts of this outcome.

- Students are pleased and feel well-prepared within many of the aspects of this national outcome when they graduate.

**Challenges**

- This is a very complex outcome of which parts are covered by many course ILOs. The aim of specific courses in contributing to this national outcome should be better explained to students at the start of the courses.
- The degree project covers the teaching activities and examination of the full outcome. However, this is not fully covered in this course's ILOs. The course syllabus will be revised accordingly.
- The part "… undertake advanced tasks within predetermined time frames …" is included in learning activities in the 1st and 3rd semesters, but not examined until the degree project course. To incorporate an ILO on this skill in a suitable course before the degree project course will be discussed.

## Assessment panel's evaluation

| **Instruction** |
|---|
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.* |
| **Strengths:**<br>• There are many ILOs in courses where students practice the different parts of the outcome with progression and finally, the degree project covers most parts of this outcome.<br>• Students are pleased and feel well-prepared within many of the aspects of this national outcome when they graduate. Questions about the structure of the education got high rankings by the ToxMaster students (generally between 5.3 - 5.5 except for the question about how well-prepared they were to apply practical skills (rated 4.9, which also is a high ranking).<br><br>**Areas for improvement:**<br>• This is a very complex outcome of which parts are covered by many course ILOs. Solution: The aim of specific courses in contributing to this national outcome should be better explained to students at the start of the courses.<br>• The degree project covers the teaching activities and examination of the full outcome. However, this is not fully covered in this course's ILOs. Solution: As suggested by the program: The course syllabus will be revised accordingly. |

- The part "… undertake advanced tasks within predetermined time frames …" is included in learning activities in the 1st and 3rd semesters, but not examined until the degree project course. Solution: To consider if an ILO on this skill in a suitable course before the degree project course should be included.
- During the interviews it was discussed if a clearer and more precise ILO for the program itself might be beneficial.

**Evaluation:**
Overall, it is the evaluation that the program meets to a large extent the requirements of the assessment criterion. The justification for that evaluation is that there still is some work to do on individual courses ILOs and also for the program itself (otherwise our overall conclusion would have been "fulfills the requirements").

## Assessment criterion: Goal fulfilment, the form of judgement and approach

**Assessment criterion: Goal fulfilment – judgement and approach**
Through design and implementation, and through assessment, the programme ensures that the student, when the degree is awarded, can achieve the selected outcomes within the form of knowledge of judgement and approach in the System of Qualifications.

**Target**
For a Degree of Master (120 credits) the student shall demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work.

Describe, analyze, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

The courses of this programme include several ILOs and teaching activities covering various aspects of scientific, societal and ethical assessments in the field of toxicology (see mapping table attached). Animal ethics is of particular importance to toxicology and is covered in lectures, individual and group assignments and discussions, for example, toxicity testing, use of toxicological data and development of new test methods. Research ethics and quality aspects also have an important place in the programme. Teaching on human ethics in relation to research projects has been given increased time in the programme as many students conduct degree projects including human cells or epidemiological studies. During the degree project, all students discuss ethical aspects of their project in groups and should also elaborate this in their written report. Scientific and societal assessment is an integral part of the programme, including assessment of different types of scientific data to elucidate health risks of chemical exposures in different population groups. Related to this, research ethics and issues such as plagiarism are thoroughly covered at different levels during the programme. Scientific assessments are included in all courses of the programme although not always reflected in the ILOs. Quality control and quality assurance is

taught in the course "*Regulatory toxicity testing*". In addition, societal assessments are repeatedly covered and most clearly in the courses "*Health risk assessment*" and "*Global toxicology in a sustainable society*".

The mapping of ILOs shows that all the three areas of assessment (scientific, societal and ethical) in this national outcome ***"demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work***" are well-covered by ILOs.

In more detail, examples of specific ILOs matching the three different parts of this national outcome are presented in Table 5. In the course "*Applications of methods in toxicological research*" and the ILO "*Make assessments considering scientific and ethical aspects regarding toxicological methodology*", students learn primarily through an individual literature assignment and getting feedback on their lab report. This ILO is examined by both a literature assignment and a lab report, as well as by the final written exam.

In the course "*Health risk assessment"*, students develop knowledge, understanding and approach to various ethical issues, such as toxicity testing in experimental animals and the transition towards animal-free models, and various regulatory requirements for e.g. pharmaceuticals, pesticides and cosmetic products. Ethical aspects, as well as scientific and societal aspects, are discussed in lectures, group assignments and in a case study of a specific health risk assessment. The ILO "*reflect on the societal and ethical aspects associated with health risk assessment from a local and global perspective, including gender equality and equal opportunities, and how chemical health risks can be best communicated to different groups*" is examined through oral presentations of cases and a written exam.

**Table 5**. Examples of courses' intended learning outcomes that match parts of the degree outcome and how they are taught and examined.

| **Programme outcome** | **Matching ILO** | **Teaching and learning activity** | **Examination** |
|---|---|---|---|
| Make assessment – scientific* and ethical aspects | Make assessments considering scientific and ethical aspects regarding toxicological methodology (2nd semester) | Lectures, individual literature assignment, feedback on lab reports | Literature assignment, written exam, lab reports |
| Make assessment – societal* and ethical aspects | Reflect on the societal and ethical aspects associated with health risk assessment from a local and global perspective, including gender equality and equal opportunities, and how chemical health risks can be best communicated to different groups (2nd semester) | Lectures, discussions, group assignments, case study | Oral presentation, written exam |
| Awareness of ethical aspects of research and | Reflect upon the ethical aspects of the project (4th semester) | WS, lecture, group discussions, presentations | Written thesis |

| | | | |
|---|---|---|---|
| development work | | | |

*As the English translation of this outcome does not exactly correspond to the legal Swedish version, we here interpret “disciplinary” as “scientific” (“vetenskapliga” in Swedish) and “social” as “societal” (“samhälleliga” in Swedish).

The last part of the outcome “… **awareness of ethical aspects of research and development work**” is matched by the ILO “*reflect upon the ethical aspects of the project*” in the *Degree project* course. Most of the students’ projects are part of research studies and a few projects performed outside of academia and research organisations are developmental studies. The master thesis must include a discussion part “*Reflect on and discuss the ethical aspects of the project (not only if the project involves animal or human samples, but also other ethical aspects of the project itself)*”. To prepare students a workshop is held at one of the monthly meetings during the course with a lecture on “*Ethical principles in biomedical research*”, followed by group discussions where the students identify and discuss ethical aspects of relevance to their own project. The assessment criteria for this learning objective is: “*Relevant ethical aspects of the project are considered and discussed in the Discussion section*” (pass level).

Regarding progression of learning related to this outcome, scientific assessments are covered in course ILOs already during the first semester, and with higher level of complexity and more individual tasks in the 2nd and 3rd semesters. Societal and ethical assessments are introduced in the ILOs of courses on the 2nd and 3rd semesters.

**Exit poll**
The following results from the Exit poll from 2023 show that the graduating ToxMaster students felt well-prepared to “**deal with the ethical considerations I face**”, average score 5.5 of 6 (where 6 is “to a very high degree” and compared to the average score for KI international master programmes, 5.0).

**Analysis and evaluation**
The programme includes all the parts of this degree outcome in many courses and the full outcome covered by several objectives that are examined in the degree project course. There is progression throughout the programme, but this is, however, not very clear from the ILOs. Graduating students feel well-prepared to deal with ethical considerations.

Plagiarism unfortunately happens, but very seldom. To prevent plagiarism the information to students and teaching activities are regularly reviewed and discussed among course directors. Several activities are currently ongoing at KI, IMM and the programme to develop strategies on how to deal with generative AI tools, both regarding written reports and home exams as examination and to include teaching activities to train students to handle these tools for their future working life.

**Strengths**
- There are many ILOs in several of the courses that cover aspects of this outcome. Altogether the outcome is well covered and there is progression in students’ learning throughout the programme.
- Toxicology is closely related to both societal needs and ethical aspects, which is explored from different perspectives in several courses.
- Students feel well-prepared to deal with ethical considerations.

**Challenges**

- Plagiarism unfortunately happens, but very seldom. Measures to prevent plagiarism are regularly reviewed and discussed.
- Progression regarding this outcome is not very clear from the current ILOs. The ILOs will be reviewed in the perspective of better matching this national outcome.

## Assessment panel's evaluation

| **Instruction** |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet*. |
| **Strengths:**<br>• There are many ILOs in several of the courses that cover aspects of this outcome. Altogether the outcome seems to be well covered and there is a clear progression in students' learning throughout the program.<br>• Toxicology is closely related to both societal needs and ethical aspects, which is explored from different perspectives in several courses.<br>• Students feel well-prepared to deal with ethical considerations. In the Exit Poll from 2023, the students felt well prepared to deal with the ethical considerations a student might face (here the average score was 5.5; the average score for all KI international master programs was 5.0).<br><br>**Areas for improvement:**<br>• Also, at the master program in Toxicology there are cases of plagiarism, but according to the self-evaluation, it does not happen often. Apparently, measures are taken by the program to prevent plagiarism. This was also confirmed during the interviews.<br>• Progression regarding this outcome is not very clear from the current ILOs. As in the evaluation of the previous assessment criterion, the program will also review these ILOs so that they better match this national outcome.<br><br>**Evaluation:**<br>Overall, it is the evaluation that the program meets to a large extent the requirements of the assessment criterion. The justification for that evaluation is that, altogether, this outcome seems to be well covered and there is a clear progression in students' learning throughout the program. |

Still there are some ILOs to work with on this issue, something the program also is planning for.

## Assessment criterion for goal fulfilment, local outcome

**Assessment criterion Goal fulfilment – local outcome**
The education enables through design and implementation and ensures through assessment that the student, when the degree is issued, can achieve the selected local outcome.

**Target**

**Master's Programme in Toxicology**
The student should demonstrate a good ability, both orally and in writing, to present a toxicological problem, both for the public and for experts.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

From analysis of the attached document mapping degree outcomes and courses' ILOs it became clear that many courses include at least one objective matching this local programme-specific outcome "***demonstrate a good ability, both orally and in writing, to present a toxicological problem, both for the public and for experts.***" This outcome partly overlaps with the national outcome "***demonstrate the ability in speech and writing both nationally and internationally to report clearly and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences***". However, the local outcome of the ToxMaster specifies "the public", as well as "experts", as important "audiences" for toxicologists.

At the ToxMaster programme students have a lot of both oral and written scientific presentations with a progression throughout the programme (see mapping table). In the beginning of the programme many assignments are on a group level as the students need to learn how to work well together with others, as well as to learn from each other. In the first course, the students have a workshop on Presentation technique in parallel with a journal club where the students get to apply what they learn during the workshop. Over time more assignments are on an individual level. The strong focus on group assignments in the first part of the programme is due both to create a safe environment where students get to know and respect each other, and learn to collaborate, but also to practice oral presentations in a less stressful way as some of the students may have limited experience in oral presentations. However, the examinations are always performed individually to ensure a fair assessment and grading of each student. In most of these courses students and teachers give feedback on presentation skills in order to support the students' learning and development.

Teaching workshops, including feedback sessions, by the KI Library Academic Writing Support are included in courses throughout the programme with progression and supporting different course assignments, such as using sources properly in the introductory course, writing a discussion of results in a laboratory report structured as

a scientific paper, and writing an introduction and popular science summary in the Degree project. The students are also repeatedly encouraged to participate in the many workshops on scientific writing (and recently also oral presentation and discussion) organized by the Academic writing support. The development of these workshops and especially the incorporation in the programme has led to a clear improvement in the presentation skills of the students. Finally, the most advanced written and oral presentations are included in the master thesis project. In the *Degree project* course students should also write a Popular science summary of their project.

**Table 6**. Examples of courses' intended learning outcomes in the Degree project course that match parts of the degree outcome and how they are taught and examined.

| **Programme outcome** | **Matching ILO** | **Teaching and learning activity** | **Examination** |
|---|---|---|---|
| Present orally and in writing for experts | clearly present and critically discuss his or her work in written and oral forms, for the scientific community ($4^{th}$ semester) | Practice oral presentation during course with feedback from peers. Workshops on scientific writing. | Written master thesis and oral presentation |
| Present in writing for the public | clearly present his or her work in written form for laymen ($4^{th}$ semester) | Interactive workshop on popular science writing | Popular science summary in the master thesis |
| Present orally for the public | - | - | - |

This local outcome regarding oral and written scientific presentations is covered by ILOs in several courses throughout the programme (see mapping document). Detailed examples on ILOs from the *Degree project* course covering "**oral and written presentation for experts**" and "**written presentation for the public**" are given in Table 6. There are workshops during the course in these areas to prepare students to develop their skills. Students also get feedback from peers and teachers on how to further improve their written drafts and oral presentations. Their skills are examined by the written thesis and the oral presentation of their master project. However, oral presentation for the public is neither taught nor examined in the programme.

**Exit poll**

The following results from the Exit poll from 2023 show that the graduating ToxMaster students felt well-prepared to communicate both verbally and in writing (Table 7).

**Table 7.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| I feel well-prepared for my future role's requirements to: **communicate in writing** | 5.4* | 5.3 |
| **communicate verbally** | 5.7 | 5.3 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

**Analysis and evaluation**
Oral and written presentations for the scientific audience are included in several courses of the programme with a clear progression.

In the mapping of this degree outcome and ILOs it was concluded that some ILOs where students are examined based on skills to “present and discuss” are phrased “discuss” (only). These objectives will be reviewed and clarified in the next round of revisions of course syllabi performed each semester.

As mentioned above, oral presentation for the public is not covered in any of the courses. After discussions among the course directors, it was concluded that this skill is important for toxicologists (and researchers) and there are now plans to include such a teaching activity, examination and corresponding learning objective in the Degree project course to prepare students to orally present toxicological findings to the public. For example, a one-minute “elevator pitch” of the students’ own master projects can be combined with the current poster mingle that is included at the end of the programme. To prepare, a teacher in rhetoric could be engaged and a suitable “public audience”, for example high school pupils, could be invited.

**Strengths**
- There are many written and oral assignments and examinations throughout the programme. Students learn and get used to both writing and presenting orally with a progression starting with shorter presentations in groups and developing into more advanced, longer and individual presentations at the end of the programme.
- Students perform very well at the end of the programme and feel well-prepared to present to future colleagues, both orally and in writing.

**Challenges**
- This local outcome overlaps partly with a national outcome. We will review the need for local outcomes for the new programme syllabus.
- The part of the outcome that deals with oral presentation for the public is not covered in any course or objective. We conclude that such a skill is important for toxicologists and there are plans to add a teaching activity and examination on this skill in the degree project course as soon as possible.
- It was also noted that some ILOs including the skill ”discuss” also teach and examine the skill ”present” and these ILOs will be revised accordingly.

## Assessment panel's evaluation

| Instruction |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should |

identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.

**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.*

**Strengths:**

- There are many written and oral assignments and examinations throughout the program. Students learn and get used to both writing and presenting orally with a progression starting with shorter presentations in groups and developing into more advanced, longer, and individual presentations at the end of the program.
- Students perform very well at the end of the program and feel well-prepared to present to future colleagues, both orally and in writing. This was also confirmed during the interviews.

**Areas for improvement:**

- This local outcome apparently overlaps partly with a national outcome. Solution: The program will review the need for local outcomes for the new program syllabus.
- The program has identified that the part of the outcome that deals with oral presentation for the public is not covered in any course or objective. Solution: To add a teaching activity and examination on this skill in the degree project course as soon as possible.
- Again, also for this assessment criterion, the program noted that some ILOs including the skill “discuss”, also teach, and examine the skill “present”. Solution: The skills to “present and discuss” will be reviewed and clarified in the next round of revisions of course syllabi performed each semester.

**Evaluation:**

Overall, it is the evaluation that the program meets to a large extent the requirements of the assessment criterion. The justification for that evaluation is that some minor modifications of some ILOs need to be done, but once again the ToxMaster students are satisfied also with the local outcome for goal fulfilment. The ratings for the ability to “communicate in writing” was 5.4 and for the ability to “communicate verbally” the rating was 5.7 in the Exit Poll 2023 (again higher scores than the averages for all international master programs at KI).

## 2.2 Assessment criterion Equal opportunities

Integrating equal opportunities into all levels of the education is a natural part of how KI should work in accordance with applicable laws and regulations. The goal of KI's courses and programmes is as expressed in Strategy 2030: "It must be ensured that the programmes provide the knowledge about gender, power and equal opportunities required to provide the conditions for equal health and social care".
Equal opportunities is an umbrella term for KI's work to promote equal rights, opportunities and obligations, and to counteract all forms of discrimination, harassment, sexual harassment, victimisation and exclusion. The Equal Opportunities area includes the seven grounds of discrimination established in the Discrimination Act

(2008:567): sex, transgender identity or expression, ethnicity, disability, sexual orientation, religion or other belief, and age. In addition, the area of socio-economic background is also included in the equal opportunities work. Broadened participation, i.e. a student's opportunity to complete their studies regardless of their background and their circumstances, is also part of the equal opportunities work.

The integration of equal opportunities in KI's education will take place at three levels:

- Content – which means that equal opportunities is an area of knowledge that is taught and examined.
- Implementation – which means that equal opportunities characterise the pedagogy so that the teaching becomes inclusive and accessible.
- Design – which means that there is a structure for how and where equal opportunities are to be integrated, and that there is progression.

**Assessment criterion Equal opportunities**
An equal opportunities perspective is taken into account, communicated and anchored in the content, design and implementation of the education.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

## Programme description

### Content

Teaching about equal opportunities starts already in the first week of the programme within the activities on team building and introduction to the pedagogy of the programme. This aims at setting the grounds for psychological safety and a safe learning environment where teachers and other students support students' well-being. Most of these activities occur at a retreat with overnight stay where teachers also inform about Swedish values and laws, all grounds of discrimination, as well as students' rights and responsibilities, in Sweden and at KI. Equal opportunities and the Swedish Discrimination Act are introduced, and the zero tolerance is emphasized.

Equal opportunities are explicitly covered in three courses during the programme. In the 2nd semester, the "*Health Risk Assessment*" course has one ILO: "*reflect on the societal and ethical aspects associated with health risk assessment from a local and global perspective, including gender equality and equal opportunities, and how chemical health risks can be best communicated to different groups*". The issues of gender equality and equal opportunities are addressed in several activities on the course. For example, a workshop where students reflect on and discuss how chemical hazards and risks are perceived, managed and communicated in different cases describing different scenarios of chemical exposure in different population groups. The phrasing of the ILO, including gender equality and equal opportunities, has recently been revised and the teaching and learning activities will be adapted to the new objective next time the course is given. It will be examined in the written exam.

In the 3rd semester, the course "*Global toxicology in a sustainable society*" has two ILOs relating to equal opportunities and one of them is to: "*identify and evaluate social and ethical aspects related to toxic chemicals and pollution from a global perspective".*

The main teaching activity is project-work performed by the students, including presentation and discussion, which emphasizes how our lifestyle may affect people elsewhere. One example is “fast fashion”, and such a project explores how our use of textiles (containing various chemicals) possibly affect people and environments in producing countries (and generate massive waste). Questions related to the various projects are also included in a final exam.

In another course in the 3rd semester “*Regulatory toxicity testing*” the students work mainly in groups and one ILO is based on group dynamics: “*based on self-awareness and knowledge on group dynamics to reflect on one's own and others' behaviour and professionalism in group situations*”. The students are trained in self-awareness and group dynamics throughout the programme (further described in section Interprofessional competence). The ILO is examined by a written reflection focusing on students’ different knowledge, experience and behaviour and how to collaborate with others.

**Implementation**
Throughout the programme, teachers aim to highlight diversity as a strength that broadens students’ perspectives and learning. Learning to work in a global and diverse environment, and practicing collaboration and communication, is highly relevant for students’ future careers. Course directors and teachers also aim to include diversity in learning materials and resources, such as carefully considering aspects of gender and ethnicity in the use of pictures and in different cases.

In each course survey there is a mandatory question to monitor any discrimination or insults: “*Have you during the course been subjected to negative discrimination or insults because of your gender, ethnic origin, religion, disability or sexual orientation?*”. Although these surveys are anonymous additional measures can be taken in case student(s) reports any discrimination/insult. The course and programme directors closely follow-up how students work together, especially when students work for weeks with group assignments and collaborate to solve advanced tasks. In these cases, students set up their own ”Rules of conduct” to promote a respectful learning environment and adapt the studies to all students’ individual needs. During the master project where students are allocated to different workplaces, course directors keep in contact with individual students, via follow-up assignments, monthly meetings in class and individual half-time meetings, to ensure their well-being.

We aim to make teaching at the programme inclusive and accessible to students with different disabilities or other needs. For example, there is a clear and harmonised structure for all courses on Canvas, also with a listening function. The students are informed about which kind of support is offered by KI (like longer exam time or sign interpreting) and students are encouraged to contact the programme or course directors or the study counsellor about their needs and any suggestions that could facilitate their studies. Also, the schedule and any deadlines are planned for daytime studies to facilitate for students with children, or who work outside of their studies. If students miss a mandatory activity, make-up assignments are available to cover what was missed. All course directors and most teachers have extensive pedagogical training, including courses on equal opportunities. This topic has also been discussed several times in recent teacher days at IMM. KI has developed a toolkit for teachers “Equal opportunities in teaching” which all teachers will be encouraged to use.

A relevant aspect of inequal opportunities in these international student groups is related to socioeconomic factors. In the KI survey on Equal opportunities from 2022 one student commented on the need for working part time while studying, which affected the opportunity to study successfully. Another example is linked to the challenges and uncertainties regarding renewal of residence permits, especially when such permits are rejected.

**Design**

In the first week students interview and present each other, and we discuss cultural (and other) differences. We explain the interactive approach to teaching at the programme and have group discussions on previous experiences and expectations. A major aim is to build relationships and trust. To further promote psychosocial health of the students, we have invited the KI Student well-being center during the first semester of the programme to discuss their web-based handbook "COPE". We have four workshops on self-awareness and group dynamics integrated into courses where there are several intense or long group assignments (further described in the section Interprofessional competence).

**Exit poll**

Results of the Exit poll from 2023 are shown in Table 8. One student commented on the best part of the studies: "*Everyone here is very open, you will be encouraged to say and discuss your opinion and you will get the first-level support*".

**Table 8.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| The physical study environment has worked well for my needs on the whole. | 5.5* | 5.3 |
| The psychosocial study environment has worked well based on my needs on the whole | 5.2 | 4.7 |
| I feel well-prepared for my future role's requirements to: Cooperate in diverse cultural environments | 5.4 | 5.5 |
| I feel well-prepared for my future role's requirement to be able in my work to encourage:<br>Gender equality, equal treatment based on ethnic background, religion, social class, age, functional variations, LGBTQIA+ perspectives | 5.7-5.8 | 5.1-5.3 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

**Analysis and evaluation**

Several teaching occasions throughout the programme aim at supporting students' psychosocial health and highlighting that we value diversity in many aspects. How to work well together and help students develop efficient teams is discussed at four workshops. We continuously tell the students that they are welcome to contact the programme management with any issue or question and we will do our best to support them. The student groups are quite small, 25-30 students, which allows a more personal relationship between students and between students and teachers. If we get informed about any misbehaviour or students not feeling well, we try to follow-up and offer support. We have followed up and responded to the few incidents reported in course evaluations. Additional surveys were sent out to further identify

the type of discrimination/insult, which showed to occur in group situations between students. Students were reminded that discrimination or insults are never allowed. How to best deal with such situations needs to be further discussed. Improvement of the introductory activity on Equal treatment will be considered, for example introductory films, discussions and anonymous Menti-questions. The heterogenous group of students is a strength, but also a challenge for teachers to know the preconditions of individual students. Using Mentimeter at the start of a course to gauge relevant skills and/or level of experience can be a tool to facilitate the appropriate support from teachers.

**Strengths**

- By promoting open and respectful relationships between students, and between students and teachers, we support a safe learning environment, psychological safety and well-being.
- Activities to address diversity and promote equality are included in the programme.
- The attendance, results and well-being of students are followed up and addressed.

**Challenges**

- Inequalities are an inherent aspect in a heterogenous group. The programme promotes accepting and valuing diversity and trains students in open, respectful and clear communication, as well as supports students as much as possible.
- Incidents of discrimination/insults occur. The information to students will be made even clearer.
- More teachers will be encouraged to take part of the KI toolkit for equal opportunities in teaching.

## Assessment panel's evaluation

| Instruction |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.* |
| **Strengths:**<br>• According to the self-evaluation (supported by the ratings in the Exit Poll 2023): By promoting open and respectful relationships between students, and between students and teachers, the program supports a safe learning environment, psychological safety, and well-being. This was also confirmed during the interviews.<br>• Activities to address diversity and promote equality are included in the program.<br>• To start the program at the very beginning with team building and information about Swedish values and laws, grounds of discrimination, students' rights, and responsibilities, in Sweden and at KI.<br>• The attendance, results and well-being of students are followed up and addressed.<br><br>**Areas for improvement**<br>• As indicated by the program itself: Inequalities are an inherent aspect in a heterogenous group. To minimize this problem the program apparently promotes accepting and valuing diversity and trains students in open, respectful, and clear communication, as well as supports students as much as possible.<br>• Incidents of discrimination/insults occur. The information to students will be made even clearer. However, this does not seem to be a major problem according to the answers to the questions about equal opportunities in the Exit Poll 2023, where the ToxMaster students gave high scores (the average varying between 5.2 - 5.8), this was also confirmed during the interviews.<br>• Clarify the importance of language skills for various work areas to increase the possibility of employment after completing studies.<br><br>**Evaluation:** Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is that the program recognizes that having a heterogenous group of students is a strength, but at the same time also a challenge for the |

teachers to know the preconditions of individual students. This was also confirmed during the interviews.

## 2.3 Assessment criterion Sustainable development

In their activities, higher education institutions must promote sustainable development, which means that present and future generations are ensured a healthy and good environment, economic and social well-being and justice.

Education conducted at KI should aim to contribute to improved health for all, which is an important prerequisite for sustainable social development. It is of particular importance that educational activities highlight the link between health, socio-economic factors and human environmental impact. In accordance with KI's climate strategy, by 2024 there will be intended learning outcomes in courses in all programmes at first and second cycle, which means that students will gain knowledge and skills about climate and sustainable development.

Students who graduate from KI must have worked with issues related to sustainable development and the UN's global goals during their education. It requires that the teachers have good knowledge in the area. Teachers need to teach about the goals and the underlying challenges. Students should also be challenged to develop an ability to create visions, use critical thinking, reflect on their own role in the development of society, apply systems thinking, create partnerships and be prepared to act.

**Assessment criterion Sustainable development**
Through design and implementation, the programme enables the student to have worked with issues related to sustainable development and the UN's Sustainable Development Goals (SDGs).

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

Sustainable development and work with the Sustainable Development Goals (SDGs) have for many years been integrated into this programme, but with increased focus in recent years. Recently, we made a timeline (Figure 2) within the programme to get an overview of both smaller elements and longer/in-depth activities. During the first course (semester 1), an introductory lecture is held during which, among other things, overall concepts are introduced and the students are allowed to reflect on how they, as toxicologists, can contribute to the fulfillment of the SDGs. Aspects related to a global perspective are also introduced (e.g. in relation to air pollution). During the second semester, there are elements related to sustainable labs, alternative (non-animal) methods and the 3Rs (Replacement, Reduction and Refinement of animal testing), and ethical aspects associated with health risk assessment of chemicals from a local and global perspective. An example of an ILO is to "*reflect on the societal and ethical aspects associated with health risk assessment from a local and global perspective, including gender equality and equal opportunities, and how chemical health risks can be best communicated to different groups*".

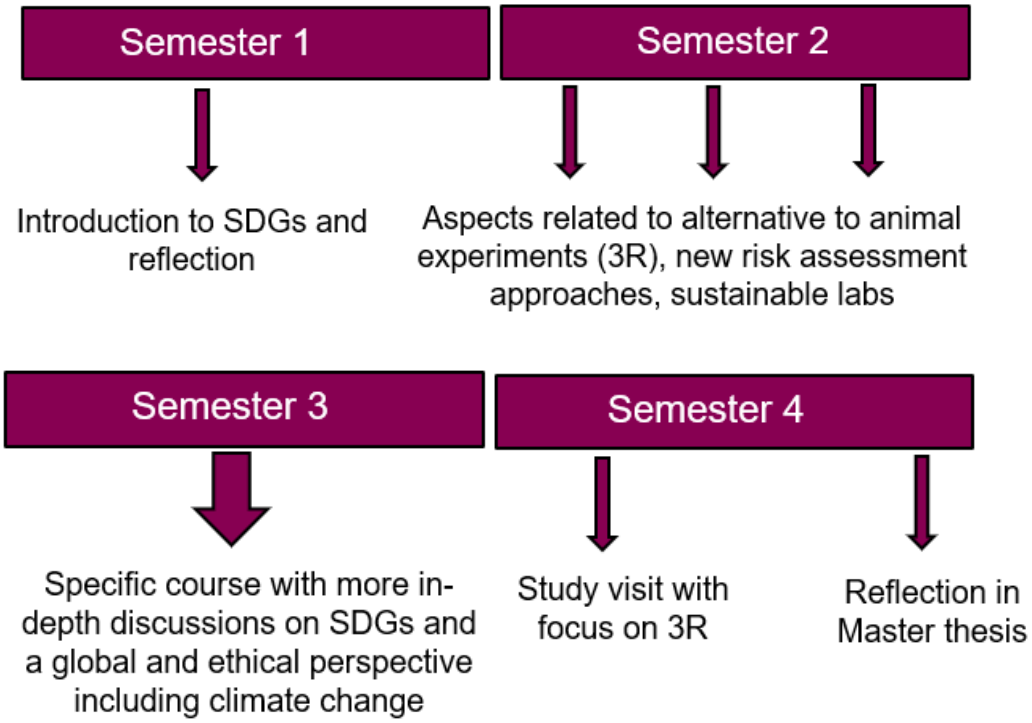


**Figure 2.** Timeline for teaching activities in the ToxMaster programme with relevance to Sustainable Development.

The more in-depth discussion takes place during semester 3 in the course "*Global toxicology in a sustainable society*", 4 credits. Here there is a learning objective specifically related to the SDGs *"define the concept of sustainable development and analyze the Sustainable Development Goals (SDGs) in light of toxicological aspects"* and also one related to climate namely: "*discuss the contribution of human activity and population size to global environmental changes such as climate change, biodiversity loss and resource depletion*". Learning activities to achieve this objective, and understand the relationship between climate change and health, are taught, among other things, through a digital module in Canvas (films related to "planetary boundaries" and climate change) and a book chapter ("The Impacts of Climate Change on Human Health and Well-Being") and the students also calculate and reflect on their own carbon footprint and lifestyle. This activity is also important for the ILO "*the student should be able to reflect on own individual consumer behavior and ways to promote sustainable lifestyles*". The knowledge is finally examined through various questions in a written exam.

Finally, during the last semester of the programme, the students make a study visit with focus on alternative to animal experiments and they must reflect in their master thesis on how their degree projects can contribute to societal benefit and the fulfillment of the SDGs: "*Reflect on and discuss the relevance of the project for sustainable development or any other broader societal perspectives*".

**Exit poll**

The following results from the Exit poll from 2023 show that the graduating ToxMaster students feel well-prepared to work and promote sustainable development (Table 9).

**Table 9.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| I feel well-prepared for my future role's requirements to:<br>**apply a global health perspective** on a variety of issues | 5.4 | 5.0 |
| have a **broad understanding of international events shaping the world** | 5.2 | 4.8 |
| **promote sustainable development** | 5.5 | 4.6 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

**Analysis and evaluation**

The idea in the programme is to include both toxicology specific aspects of sustainable development that relates to emerging chemicals that could be a threat to future generations (e.g., endocrine disrupting chemicals) and new methods and risk assessment approaches to avoid the use on animals. The deeper understanding gained during semester 3 allows progression and aims to provide the students with both an ability and a will to work for sustainable development. Education for sustainable development calls for skills like critical and ethical thinking and reflection, an ability to create visions and partnerships, and self-awareness. Such aspects are preferentially trained using non-traditional pedagogical approaches including an active student-centered approach and co-creation of the content. Such pedagogical approaches are very much used in the course.

**Strengths**

- There is a clear idea of how the concept of sustainable development is taught with progression in the programme.
- Students are very engaged in this area and feel well-prepared when graduating (several of the students get engaged in "Students for Sustainable Development" at KI).
- One of the course directors, Hanna Karlsson, is also an expert in this area and the programme has recently increased the size of the main course particularly focusing on this subject: "*Global toxicology in a sustainable society*".

**Challenges**

- Teaching in the area needs to be constantly updated and this takes resources.
- Much teaching is connected to one teacher, which could be an advantage in terms of avoiding repetition and ensuring progression but may also constitute a risk.

## Assessment panel's evaluation

**Instruction**

For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:

**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.

**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.

**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.*

**Strengths**

- There seems to be a clear idea of how the concept of sustainable development is taught with progression in the program.
- Students are very engaged in this area and feel well-prepared when graduating (several of the students get engaged in "Students for Sustainable Development" at KI). This can also be seen in the answers to the questions about sustainable development in the Exit Poll 2023. Whereas the average rating by the ToxMaster students varied between 5.2 - 5.5, the average rating for all international master programs varied between 4.6 - 5.0.
- Apparently, it is one of the course directors, who is the expert in this area and probably also the driving force behind the fact that the program recently increased the size of the main course particularly focusing on this subject: "*Global toxicology in a sustainable society*".

**Areas for improvement:**

- As indicated above, much teaching about sustainable development (in the context of toxicology) is apparently connected to one teacher, which could be an advantage in terms of avoiding repetition and ensuring progression but may also constitute a risk if that teacher is sick or leave for another position.

**Evaluation:**

Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is that there seems to be a clear idea of how the concept of sustainable development (not always easy to define) is taught with progression in the program. This was also confirmed during the interviews.

## 2.4 Assessment criterion Follow-up, measures and feedback

In order to ensure that an education is of high quality in both the short and long term, follow-up of the education's design, implementation and results is required. It concerns how follow-up, action and feedback routines in the systematic quality work at the educational level contribute in a systematic way to ensuring and developing the quality of the programme. The self-evaluation must describe how the various parts of the programme are continuously followed up and how the results are taken care of. An important part of taking care of results from follow-ups is to inform interested parties such as teachers, supervisors and students about any measures and changes to strengthen the quality and the continuous learning.

The assessment criterion for follow-up, measures and feedback also includes how those responsible for the programme work with student completion. The programme should therefore describe its analysis of student completion of the programme and the drop-outs that occur. The programme must also describe the measures taken and the support provided, if necessary, to create the conditions for students to complete the education within the planned study time.

**Assessment criterion Follow-up, measures and feedback**
The content, design, implementation and examination of the programme are systematically monitored. The results of the follow-up are translated into quality development measures as necessary, and feedback is given to relevant stakeholders.

The programme works to ensure that the student completes the education within the planned study time.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

Please note that the assessment criterion has two parts, quality work and student completion, and both must be included in the programme's report.

### Presentation of Quality Assurance of first and second cycle education at KI – central level

The quality assurance system for first and second cycle education at KI runs in annual cycles, with some components included each year while others are implemented at longer intervals. The system thus also allows for flexibility in question formulations, themes and priorities between years. Overall, the system's components for quality assurance routines, regulations, follow-ups, reviews, feedback and improvement, ensure continuous improvement of the education. In order to improve and develop the programmes, the education assignment at the departments is followed up annually. The feedback forms the basis for development and ensures that KI's educational activities are of high quality. The feedback consists of a number of questions within a strategic selection of the areas that the Committee for Higher Education identifies as important for the quality of education. The questions vary from year to year and over time new areas may be added. The purpose of the questions is

to stimulate the quality development process locally and to provide KI's management with a basis for following up, developing and assuring KI's educational activities.

The reporting of the education assignment is supplemented by quality plans at department level and programme level according to established templates, which is a tool for quality development at each level.

In order to clarify what the committee responsible for the programme expects from the department responsible for the course in terms of implementation and quality development of courses, course assignments within programmes must be established. After each course occasion, the department responsible for the course must carry out a final course evaluation. Based on the results of the course evaluation, the course coordinator must carry out a course analysis.

### Perceived quality – Recurring surveys

1. **A survey** is conducted every two years among students who are just starting their studies on one of KI's programmes
2. **Course evaluations** consists of five mandatory questions, which provides an opportunity to follow the quality development over time and make comparisons between different courses and programmes. It is also possible to add programme- and department-specific questions.
3. **Practical placement (VFU) survey**, measures student experience of the learning environment, supervision and work with patients (clients in clinical education) in health care.
4. **The student barometer** is conducted every four years through focus panel interviews. The aim is to provide strategic guidance to build student' engagement in studies and for KI.
5. **A graduate questionnaire (exit poll)** is sent to all programme students in connection with the completion of their education.
6. **Alumni survey** is conducted every four years among alumni who graduated three years earlier.
7. **Stakeholder survey**, conducted by the programmes every four years. The purpose is to investigate whether KI's educational programmes correspond to the needs of the labour market, i.e. whether recent graduates have developed useful skills.
8. **The "Equal Opportunities" survey** is planned to be carried out every four years from 2022, the aim is to measure student experience of risks of discrimination, harassment, sexual harassment, reprisals and victimisation in order to obtain a basis for following up and evaluating KI's work to prevent discrimination and work for an inclusive and good work environment for students.

### Peer review and learning

1. In addition to our own analyses, peer review and learning is an important component of improvement and development work. Peer review and learning concerning quality plans is carried out every spring.

## Programme description

### Quality work

The following surveys and evaluations included in KI quality assurance system are used by the programme.

- The survey for new students is used to analyze how students receive information about the programme before applying in order to develop the recruitment process and identify effective measures to reach the prospective students.
- Course evaluations are used by course directors to continuously develop the courses and by the programme director to monitor the quality of the programme to identify specific needs for changes.
- The graduate questionnaire (exit poll) is used by programme director and course directors to analyse how the students overall have perceived their studies and learning in the programmme to continuously develop the programme.
- In the last alumni survey sent to all KI alumni there was a very low response rate, maybe due to their current e-mail addresses not being available. The programme has previously (in 2017 and 2023) sent out their own alumni surveys that were useful to follow how well the alumni had been prepared for their working life, as well as giving input to the process of developing a new programme curriculum.
- A stakeholder survey was performed by the programme in 2018 and useful information from potential employers were collected.
- The equal opportunity survey sent to KI students in 2022 were unfortunately only answered by a few students from the programme but the results were still useful for developing an equal and supportive environment for all students.

Since the programme has started every year (from 2015) the average response rate in course surveys has been 75% (ranging between 68-82% per year), compared to the average 61% for KI's international programmes (2022/23). This high response rate means that we can trust the results of the course surveys. For the ToxMaster exit poll, that was introduced in 2018, there was an even higher average response rate, 84%, compared to the KI average for international programmes, 60% (2023).

The programme has also sent additional specific surveys to the students to monitor admitted students' needs and their plans of starting their studies, and follow-up surveys on specific topics in certain courses, e.g. collaboration within groups. During the distance teaching periods in the pandemic several surveys followed up the students´ well-being and learning. Another aspect of the quality assurance is the course analysis performed by the course director, based on the course survey and other information. The programme´s quality plan describes the planned quality improvement activities and follow them up and analyses the quality of the programme. The quality plan is approved by IMM Education committee and followed-up at each meeting. It is also discussed with other programmes at the annual peer review meeting for the quality plans.

**Analysis and evaluation**

The results of the course surveys, exit polls and other surveys are thoroughly and continuously followed-up and monitored. Course directors analyse the results of their courses and suggest improvements (if needed). We put a lot of effort into developing a close relationship with the students and show that they are always welcome to contact us about any suggestions for improvement. We start building this relationship already when they are admitted to the programme and intensify such activities during the first week at the programme, with various welcome and information activities, a retreat with an overnight stay in the archipelago and social activities together with the

2nd year students. We introduce the structure and questions of the course surveys and explain why we want their input and the importance of a high response rate for the course and programme development and quality. We communicate regularly with the students (programme and course directors teach a lot at several courses and get to know the students) to facilitate informal questions and feedback from students. Results of course surveys and exit poll are summarized and presented to course directors and students. At the start of each course, results from the previous course survey are presented and any changes to the course described and linked to the opinions of the previous students.

Course directors meet regularly, at least once each semester, to go through the results of course surveys and exit polls and changes and planned developments are discussed. Students are in general pleased with the courses and are giving specific feedback on areas to further improve. The survey results are monitored over time and any changes analysed to understand how to further improve the courses and the programme as a whole. We believe that a high response rate is critical for the usefulness of the survey results. Although a continuous oral dialogue with the students is important, the responses from a large part of the class answering anonymously give us a more complete and trustworthy picture of students' opinions.

**Strengths**

- The different parts of the quality assurance system are well developed in the programme and form a natural part of the continuous development work.
- The high response rate in the surveys makes the results useful and the students are engaged and want to contribute to development.

**Challenges**

- Course analyses are important for the improvement work by the courses directors but have not been systematically discussed at the meetings for course directors or at the IMM Education committee. Such discussions will be introduced in the future.
- Few students had added their private email addresses in Ladok when the previous KI alumni survey was conducted probably leading to the low response rate. Students are now sharing their private email addresses to a greater extent.

## Student completion

The student groups at the ToxMaster programme are very heterogenous regarding previous education, cultural background, personality/behaviour, socioeconomic possibilities, as well as English skills. They also differ in whether their main interest is to become a toxicologist or a PhD student.

An advantage with having quite few students, on average 25 students per year, is the quite easy follow-up of each one of them. We have quite strict specific entry requirements for our courses (as the courses usually build on each other). Therefore, we early on can identify if a student has any particular difficulties or needs and we then discuss the situation with the student to identify if any support is needed. We offer at least two re-exams after each ordinary exam (at time-points that do not coincide with any mandatory activities in subsequent courses) before the next regular exam at the next course occasion. Students that do not meet the entry requirements for a course are offered the possibility to apply for an exemption, which can be approved based on the assessment of the predicted ability of the student to successfully pass the course. It is very uncommon that a student is stopped from

continuing to the next course. Almost all students that experience initial difficulties and fail exams during the first semester develop their skills and learn how to successfully pass the courses.

The student completion rate has since 2015 been 100% in all student groups, except one (Table 10). A few students had study-breaks, but returned to their studies next year.

**Table 10.** Number of ToxMaster students that applied, were admitted, number of places, started and graduated in years 2015-2023.

| Year | Eligible applicants | Admitted | Places | Started | Graduated* |
|---|---|---|---|---|---|
| 2015 | 60 | 40 | ? | 24 | 24 |
| 2016 | 103 | 30 | ? | 22 | 22 |
| 2017 | 120 | 34 | ? | 24 | 24 |
| 2018 | 120 | 35 | 27 | 21 | 21 |
| 2019 | 124 | 52 | 27 | 25 | 24 |
| 2020 | 134 | 52 | 26 | 29 | 29 |
| 2021 | 153 | 51 | 28 | 28 | 28 |
| 2022 | 142 | 51 | 28 | 29 | |
| 2023 | 140 | 51 | 27 | 21 | |

*Number of students that completed all courses (may or may not have applied for their diploma)

**Analysis and evaluation**

Over the years we have had a very high student completion rate. If there is a student not participating in the teaching, mandatory activities and/or exams the course director, the PD and/or study counsellor invites the student to discuss their situation. We follow-up each of the few cases of drop-outs (to see if we can support the student to re-start the studies, as well as to better understand the reasons for discontinuation). One major reason for not passing exams have been insufficient English skills. After analysis of students' documentation of English skills, when applying to the programme, and their results in courses during the first semester, it was concluded that some types of certificates and some scores in tests, although within the requirements for eligibility, were not sufficient for passing the courses. The speaking skills were especially insufficient in some students, but also the writing skills. The poor English skills also contributed to conflicts between students during group work as the students with poor language skills did not contribute to the groups' tasks as they were expected to. Since then, the course requirements have been further clarified to students, as well as the consequences of not passing examinations. After this analysis new applicants have been carefully assessed and less merit points were given to applicants that did not show clear and trustworthy English skills.

**Strengths**

- There are very few drop-outs and the few that need a study break are thoroughly followed-up and offered support. In most cases these students continue and successfully complete their studies the year after.

**Challenges**

- Some students, although eligible, have insufficient knowledge and skills in English when they start the programme. Actions taken include both support to students and carefulness in the assessment of applicants' qualifications.

## Assessment panel's evaluation

**Instruction**

For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:

**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.

**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.

**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.*

**Strengths:**

- It seems as if the different parts of the quality assurance system are well developed in the program and form a natural part of the continuous development work.
- The response rates in the course evaluations and other types of surveys are indeed high. The high response rate in the surveys makes the results useful and the students are engaged and want to contribute to development.
- According to the self-evaluation, there are very few drop-outs. It is stated that the few that need a study break are thoroughly followed-up and offered support. In most cases these students continue and successfully complete their studies the year after.

**Areas for improvement:**

- The program obviously recognizes that course analyses are important for the improvement work by the course directors. However, they have apparently not been systematically discussed at the meetings for course directors or at the IMM Education committee. Solution: Such discussions will be introduced in the future.
- Some students have insufficient knowledge and skills in English when they start the program. According to the self-evaluation, actions are taken to minimize this problem, for example to give support to students, and by being careful in the assessment of applicants' qualifications.
- Closer contact with companies and authorities to review skills needs to increase the possibility of employment.

**Evaluation:**

Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is given by the two examples of strengths listed above. When it comes to the response rate for the course evaluations at the ToxMaster program, they are indeed impressive: in average 75% (varying between 68 – 82% from 2015 – 2023). The response rates are clearly higher than the average for all international master programs at KI. The response rate in the Exit Polls was 84% for the

ToxMaster program (average 2018 – 2023), in comparison to the average for all international master programs at KI which was 60% (2023).

# 3 Assessment area: Student perspective

## 3.1 Assessment criterion: Student perspective

The student perspective concerns the actual student influence in their education, both formally and informally. Formal influence means, amongst other things, student representation in various bodies and platforms. It is relevant how students participate in decision-making processes, including the preparation of issues related to the education, and what the information channels look like to reach out to students so that they can take an active role in the work of developing the education.

Student influence is also about individual influence, that which is more informal and that concerns the individual student, e.g. what the work looks like so that a student can take an active part in developing their education and their learning processes. The programme should describe a student's opportunities to participate in the quality work of the programme and in the development of the programme, as well as describe the information channels available to pick up and take student views into account.

**Assessment criterion: Student perspective**
The student is given the opportunity to take an active role in the work of developing the content and implementation of the education.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Presentation of the organisation of student influence at KI

The students are co-actors in the university's QA-activities and thus also have a shared responsibility in influencing and developing the education. In order for student influence to be realised, students are expected to take an active and committed role both as individuals and as a collective. A prerequisite for this is that the students' views, opinions and suggestions are asked for and met with respect. KI has a responsibility to facilitate and encourage the students' involvement in the development work.

KI's management meets regularly with the student unions for information exchange and consultation. At these meetings, it is discussed how student influence and collaboration with the student union works formally and in practice. In order to create a good study environment, it is required that the students' views on the education and the study environment are taken into account. The Academic Vice President for first and second cycle education meets regularly with representatives of the student unions for information exchange and consultation on these issues.

To ensure that student influence is realised at all levels, an agreement is reached annually between KI and the student unions on how student influence is to be secured

in the bodies that deal with issues relating to education or the students' situation. The student unions are responsible for allocating places between the unions, conducting elections/appointing student representatives and that a gender equality perspective is taken into account. The student representatives who are appointed represent all students regardless of level of education, programme affiliation or union membership.

## Programme description

As was described in the section on Follow-up the programme and course directors put emphasis on developing a close and open relationship with the students. We believe that it is important to know all students by face and name. We work hard on promoting a safe and inclusive environment so all students that want to also can tell their opinion and thereby contribute in various ways to the development of the programme and its courses. We emphasize to students that we really appreciate and need their contributions as student representatives, especially in the IMM Education committee (UN). Decisions are primarily taken in the UN where we currently have two student representatives from the ToxMaster. The UN-IMM is responsible for only two programmes (in addition to some courses in other programmes) which means that there is room for students' opinions on the ToxMaster at the UN meetings. Some PD decisions are also taken together with a student representative.

We also continuously encourage students to answer all surveys and are happy to get a very high response rate (see section on Follow-up). We also invite all students to course councils which are scheduled in all courses longer than 5 credits. We believe that there is no reason to limit the course councils to only student representatives, but all students that are interested are welcome to participate and give their opinion on the ongoing course. If there is not enough time or possibility to make changes proposed by students during the current course, such suggestions are considered in the course analysis for next year's course. Also, as the course directors are working closely together such suggestions can be considered for subsequent courses. It is important that students get the opportunity to comment on and make suggestions within the courses, but the written responses (course surveys) from a large part of the students at the end of the courses are considered more useful as students may have different views.

Another possibility to influence the programme is at individual meetings with the PD at the start of the second year. These meetings focus primarily on the students' plans to get a master project and supervisor that match with their personal interest. In addition, the students are asked to give their opinion on the programme so far and most students share their thoughts which is very valuable for the programme management.

### Degree projects

The degree project offers the student an excellent possibility to have an active role in influencing the content of their studies. At the ToxMaster programme students approaches potential supervisors in areas of their interest to find their projects. The students do their projects in research groups, at KI or other universities, or in workplaces at authorities or companies. Since 2015, out of the 206 students that have graduated (or soon will graduate) 30% have performed their master project at IMM, 32% at other departments at KI, 9% at Swedish universities other than KI, 2% at Swedish research institutes, 7% at Swedish regulatory agencies, 10% at companies and remaining 10% countries outside Sweden, as exchange students or as free-movers.

In order to facilitate the students' choice of a master project, we organize a half-day event every year in the spring where we invite potential (former) supervisors to present suitable master projects. We invite both internal and external researchers, as well as professional toxicologists, who suggest a broad range of projects. In this way we increase the diversity of the projects and supervisors and enable students to find a good match. We also organize a poster session where each second-year student presents a poster based on their master project. First year students are invited to attend to mingle, get tips and inspiration for good projects and research groups. The course director has individual meetings with the students at the beginning of the second year and discusses their plans for the master project and give advice and support, if needed.

**Meeting with students**

During the process of writing this self-assessment the programme management invited current students and recent alumni to a meeting to discuss and give their opinions on some selected aspects being evaluated. One of these was "Student perspective" where students discussed: *Are there sufficient informal and formal opportunities to influence and develop the education? Any information or forum missing?*

Both first- and second-year students commented that there are enough surveys. The course councils in the middle of the courses are also good, but the students would like to better understand how much of an influence the students can have (especially the first-year students that are still quite new at the programme) and what feedback are going to actually be taken into account and implemented. It was also discussed if a programme council with students and programme management (which we currently do not have) would contribute to further improving students' influence on the programme development. A potential need for a programme council with students will be further discussed.

**Exit poll**

The following results from the Exit poll from 2023 show that the graduating ToxMaster students are pleased with their possibility to influence the courses and the programme (Table 11).

**Table 11.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| Over the course of the education, I received information on my opportunities to influence the programme's courses | 5.5* | 4.8 |
| I was encouraged by the teachers to participate in the development of the courses in the programme | 5.5 | 4.6 |
| Overall, I am satisfied with my study period at KI | 5.5 | 5.2 |
| I would recommend KI to prospective students | 5.6 | 5.3 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

**Analysis and evaluation**

We have a close and personal relationship to our students which contributes to informal contact besides the formal fora. The students are engaged in the development of the programme and there are high response rates at course surveys and exit polls which make the results of these surveys useful. Individual meetings further add to the input from students.

It could be difficult for new international students to understand the system with representatives appointed by the student union, how and when to apply for positions, the role of different fora, such as the UN, and the role of student representatives. We usually invite representatives from the student union (Medicinska Föreningen, MF, and its Biomedical Educational Section, BUS) to the programme kick-off event that we coordinate together with other master programmes in the biomedicine area.
The programme will continue to inform and encourage students to contribute, for example at the start of courses.

Sometimes course directors experience limited feedback from students at course councils (within longer courses where there is a possibility to make changes already in the ongoing course). Modified set-ups will be tested, such as anonymous input via Padlet or Menti, to increase the responses.

A potential need for a programme council with students will be further discussed. Examples of topics to bring up could be recruitment of students and the development of a new programme curriculum.

**Strengths**

- We have a very high response rate at the different surveys and students are engaged in contributing their views on the courses and the programme as a whole.
- Individual student meetings with the PD at the start of the second year to get the opportunity to give their view on the programme so far.

**Challenges**

- Sometimes course directors experience only limited feedback and constructive suggestions from students at course councils. New structures for these councils will be tested and what kind of influence students can have on course development will be clarified.
- Some years it is difficult to get student representatives. The programme will continue to inform students on the different ways to contribute to the quality development of the programme.
- A potential need for a programme council with students will be further discussed.

## Assessment panel's evaluation

| Instruction |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet.* |
| **Strengths:**<br>• As indicated above (under Student completion), the ToxMasters program has a very high response rate at the different surveys, and the students are engaged in contributing their views on the courses and the program as a whole.<br>• According to the self-evaluation, each individual student meets the program director at the start of the second year to get the opportunity to give their view on the program so far.<br><br>**Areas for improvement:**<br>• A reflection in the self-evaluation is that the course directors sometimes experience only limited feedback and constructive suggestions from students at course councils. Solution: New structures for these councils will be tested and what kind of influence students can have on course development will be clarified.<br>• Another reflection was that some years it is difficult to get student representatives. Solution: This is not unique for the ToxMaster program, but the program will continue to inform students on the different ways to contribute to the quality development of the program.<br><br>**Evaluation:**<br>Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is that the program is aware of some challenges, and it shall also be noted that the ToxMaster students were pleased when they answered some specific questions about their possibilities to influence the courses and the program in the Exit Poll 2023: The average rating varied between 5.5 - 5.6 (for all international master programs at KI, the ratings varied between 4.6 - 5.3). |

# 4 Assessment area: Working life and collaboration

## 4.1 Assessment criterion Working life and collaboration

Working life and collaboration concerns whether the education is useful in the labour market and in what way the education prepares the student for a changing working life. This means that after graduation, a student should be able to use the knowledge and skills that the student has gained through their education and develop them throughout their professional life and in different work contexts. This requires that the student acquires both subject-specific knowledge and general skills and abilities during the education. Within this assessment area, the programme shall describe the way in which the education is updated and adapted to working life, and in what way information is obtained that is relevant to the quality assurance and development of the education regarding the education's usability and preparation for working life. The programme should also describe how collaboration with the surrounding society takes place in order to ensure high quality in the education. This assessment area also includes how the programme works to utilise alumni's experiences in the development of the programme.

**Assessment criterion Working life and collaboration**
The programme is designed and implemented in such a way that it is useful and develops the student's preparedness to meet changes in working life. Relevant collaboration takes place with the surrounding community.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

**Aim of programme**

Recent years have seen stricter regulations for chemical safety of various types of products globally and especially in the European Union. There is a clear and increasing demand for toxicologists and risk assessors in society. The ToxMaster programme aims at educating students for a career as professional toxicologists working in governmental agencies, industry or as consultants. They may work with regulatory toxicology, toxicity testing, safety assessments or research and development. In addition, the programme prepares for a continuation as a doctoral student and a career in academia or elsewhere. The European societies of toxicology, Eurotox, coordinates the register for competent toxicologists, the European Registered Toxicologists (ERT), based on specific and harmonised critera. The ToxMaster programme ensures that students graduating from the programme fulfil the course requirements to become an ERT. Thus, the ToxMaster does not lead to a professional degree, but this master degree facilitates the alumni’s further career in toxicology.

**Stakeholder survey**

In order to get more detailed information about the need for competence of newly graduated toxicologist a survey was sent to 39 employers in Sweden in 2018. The response rate was high (82%) and many of the respondents were ToxMaster alumni. Questions asked were related to the different areas taught at the programme, if these were more or less important from the perspective of the responder, as well as if

anything important was missing. The responders were mainly from different regulatory agencies, industry, companies and institutes. The result showed that no area related to toxicology was missing and no area taught was considered of low importance. Also, generic skills were included in the survey and were highly appreciated by the responders. Based on a suggestion from student representatives a question was also included regarding the importance of Swedish language skills. It was very clear that outside of academia Swedish language skills are required to get a position in Sweden. This message is since then clearly forwarded to new students that may consider a future career in Sweden after their studies. Based on follow-up of alumni we know that many international students want to stay in Sweden and many also get positions at Swedish universities, but also at companies and authorities.

**Teachers' networks**

The course directors have contacts and collaborations with all relevant types of stakeholders, both nationally and internationally. This facilitates the monitoring of both new scientific and regulatory developments. Course directors and other teachers also regularly participate in scientific conferences and expert meetings within the field and their own areas of expertise ensure an up-to-date level of the content of the courses. The programme invites ToxMaster alumni and other external teachers, from academia, as well as from regulatory agencies and companies in the pharmaceutical and chemical areas to teach or contribute as supervisors. Thereby, students get insights into potential career opportunities, possibilities to expand their networks, and can discuss with these alumni teachers.

**Collaboration with EU bodies**

Since many years the ToxMaster programme collaborate with organisations of relevance to toxicology at the European level. The most important example is the European Commission Joint Research Centre (JRC) in Italy, and their unit working for alternatives to animal testing, ECVAM. The ToxMaster students have since 2004 been invited to visit JRC at the end of the programme. These visits have developed into a broader Summer school on Alternative approaches in science in collaboration with the programme directors. Nowadays, the biennial Summer school invites around 150 junior scientists (including the ToxMaster students) that are trained in the latest development and approaches regarding alternatives to animals in research, toxicology and regulatory legislations. The host appreciates the opportunity to discuss with "the next-generation toxicologists". The years this Summer school is not given we visit the JRC and the European Food Safety Authority (EFSA) in Parma. Several recently graduated alumni have done traineeships at both hosting institutions.

**Collaboration with AstraZeneca and RISE**

Since the programme started in 1976 a very important collaboration has been with AstraZeneca (AZ) and their Safety Assessment department in Södertälje. Since the close-down in 2012 we still collaborate with former AZ toxicologists now working with toxicity testing at RISE (Research Institutes of Sweden). The ToxMaster programme has since 2014 an agreement regarding teaching for a specific course "*Regulatory toxicity testing*" in which most teachers are from RISE. This collaboration contributes to the course being unique worldwide and also highly appreciated by employers. Students get hands-on experience from a real toxicity study in rats, including study plan, Standard Operating Procedures and raw data, to discuss with experienced toxicologists as tutors, to analyse, summarise and interpret the results and finally together write one toxicity report, as this is done in the real-life situation. The students cannot be involved in the practical parts of the study, but get a visit showing all the methods in the test facility by the experienced staff. Another asset of this course is

that students learn about quality assurance and Good Laboratory Practice as it is used to fulfil regulatory requirements in industry studies. RISE also hosts students during their master projects.
In addition, several other study visits are included in the programme. Such visits show students the work at relevant organisations, but course directors thereby also build and develop relationships with the hosts. Examples are the Swedish Poison center, the Swedish Chemicals and Food Agencies and the Swedish Medical Products Agency.

**Career workshop**
In 2023 a 2-day Career workshop was introduced on the 3rd semester. The aim of the workshop was to show the students different paths for a future career and how to successfully plan for getting the position they want. Ten recently graduated alumni presented their careers, how they got their positions, and shared useful tips. Students asked questions to the alumni, who offered their guidance and welcomed any contacts from the students. The alumni were PhD students at KI and abroad and toxicologists at companies.

**Exit poll**
The results from the Exit poll from 2023 show that the graduating ToxMaster students felt well-prepared to work within toxicology, on average 5.0 of 6, where 6 means "to a very high degree". The KI average for international programmes was 4.7. For 17 specific aspects of skills the ToxMaster graduates rated on average 5.4 (range 5.1-5.9), compared to 5.2 (4.6-5.7) for KI international masters. In the exit poll two students also commented on "the best part about your study period?": "*The knowledge about various different areas and fields of toxicology and the feeling that I am qualified to pursue all of them*" and "*I liked very much that our master's programme arranged study trips/visits. It was really nice to combine learning with exploring new places and networking with other people".*

**Alumni**
During the process of writing this self-assessment six recent alumni discussed: *Did the education prepare you for working life? Regarding necessary subject-specific and generic skills? Did the education provide appropriate contacts with working life?* These alumni agreed that there were great opportunities to meet experts from research and authorities which they found very helpful. They also felt prepared to work both independently and as part of a multidisciplinary international team, which is very helpful for the workplace. However, more internships and more contact with companies were requested.

The programme management tries to keep track of all alumni through searches on LinkedIn. There is also a LinkedIn Alumni group for previous (and current) ToxMaster students. When the programme and course directors in 2023 started to discuss a new programme curriculum a survey was sent to alumni who graduated in 2017-2022. They were asked to give feedback on "*What do you think was lacking in the ToxMaster curriculum? What did you think was redundant or unnecessary?*". The result from this (18 answers) and further surveys will be used in the curriculum development.

**Analysis and evaluation**
The programme has established active contacts and collaboration with many relevant institutions in the broad field of toxicology, both in Sweden and in Europe. Some teachers also have collaboration at the international level, at OECD or WHO. Students meet many teachers and thereby get the opportunity to expand their networks.

External teachers are interacting with the students and appreciate their knowledge and enthusiasm for the “next-generation methods” in toxicology. The students also mention that they feel knowledgeable and competent when listening to lectures from international experts in the field.

More internships and contacts with companies are requested by recent alumni. This will be considered in the process of developing a new curriculum. Toxicology is in a transition phase and students learn both traditional and new methods to be prepared to meet upcoming changes in working life. The role of generative AI will be further discussed and courses updated as appropriate.
The IMM board, where national authorities are represented, regularly share their predictions on aspects for future working life and these will be used also for the development of the ToxMaster. Intense contacts with different stakeholders are planned in the development of the new curriculum to keep the content relevant and up to date with the needs of society.

**Strengths**

- The course directors’ valuable networks ensure an up-to-date analysis of the broad area of toxicology that is used in the continuous development of the courses.
- The courses involve many ToxMaster alumni as teachers, a Career workshop, several study visits and prepare students for achieving the professional title, European Registered Toxicologist.
- Students feel well-prepared for working life, alumni are in general positive and stakeholders confirm that the subjects taught are relevant and complete.

**Challenges**

- More internships and contacts with companies will be considered in the process of developing a new curriculum.

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## Assessment panel's evaluation

| Instruction |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: Meets/Meets to a large extent/Meets to some extent/Does not meet. |
| **Strengths:**<br>• From the self-evaluation (and we agree): The course directors' valuable networks ensure an up-to-date analysis of the broad area of toxicology that is used in the continuous development of the courses.<br>• From the self-evaluation (and we agree): The courses involve many ToxMaster alumni as teachers, a Career workshop, several study visits and prepare students for achieving the professional title, European Registered Toxicologist.<br>• From the self-evaluation (and we agree): Students feel well-prepared for working life, alumni are in general positive, and stakeholders confirm that the subjects taught are relevant and complete.<br><br>**Areas for improvement:**<br>• We also agree with the analysis made in the self-evaluation that more internships and contacts with companies should be considered in the process of developing a new curriculum. This was also confirmed during the student interview.<br><br>**Evaluation:**<br>Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is mentioned as strengths above, and the evaluation committee appreciates that one of the reflections in the self-evaluation was "Toxicology is in a transition phase and students learn both traditional and new methods to be prepared to meet upcoming changes in working life". It shall also be noted that the results from the Exit Poll 2023 show that the graduating ToxMaster students felt well-prepared to work within the area of toxicology (on average 5.0 of 6). |

## 4.2 Assessment criterion Internationalisation

According to Chapter 1 § 5 of the Higher Education Act, the overall international activities at each university shall contribute to strengthening the quality of education and research, as well as promoting sustainable development both nationally and globally in the areas of higher education. The challenges of the future are global and must be solved in collaboration across national borders. Working in healthcare, in business or in academia requires intercultural competences. KI therefore has a responsibility to prepare all students for global citizenship, i.e. a global social responsibility and an ability and willingness to contribute. This requires a well-integrated education in global health and training in intercultural competences.

Internationalisation at home (IaH), which involves integrating intercultural and global perspectives into education, provides good conditions for sustainable and integrated internationalisation that reaches everyone. This can be done, for example, by utilising and sharing the experiences of students and teaching staff from different international contexts. The environment at KI is international and this in itself can be used as a resource. The rapid development of digitalisation offers great opportunities for international teaching without physical travel, for example through guest lectures digitally or group work online with students from partner universities. However, mobility remains an important part of internationalisation and programmes should actively create opportunities for this. Teaching in English provides an opportunity to receive and integrate exchange students and local students, but above all it strengthens students in their profession, prepares them for research, a global job market and a professional life in a multicultural society.

**Assessment criterion: Internationalisation**
The programme is designed and implemented in such a way that it develops the student's intercultural competence and the student's readiness to work in a global labour market.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

### Programme description

**International programme, international students**

Since 2010 the ToxMaster programme is an international programme taught in English. The students come from most parts of the globe and so far 61 different countries have been represented in the student groups. This mix of students from different parts of the world in itself creates an international environment and students learn from each other and also learn how to communicate well and collaborate with people from all over the globe. In addition, both research and regulatory toxicology are areas at an international level. The legislations on chemical safety, although in the EU-context, are becoming more and more internationally harmonized in the interest of facilitating international trade. The international flavour of the programme and its advantages and challenges is brought up at many occasions throughout the programme. Importantly, a series of workshops on “Self-awareness and group dynamics” is included in the programme (further described in section Interprofessional competence).

**Teaching activities at course level**
Within the master's programme in toxicology, we pay attention to cultural differences and the strength of an international environment in discussions with the students already in the first week of the program. In all courses we mix the students in groups so that they can bring many different perspectives into their discussions. An example from the course "*Global toxicology in a sustainable society*" is that the students' different backgrounds are used in a more conscious way during discussions. One task is, for example, to analyze the fulfillment of the Global Sustainability Goals in different countries, and here the students have the opportunity to choose which country they want to study. They often choose a country they have some relationship with, such as the country they were born in, and in discussions about how the country fulfills the Global Goals, they become "experts" on their country and this gives room for discussions related to different cultures, etc. This activity is appreciated by the students. In addition, teachers come from many different countries and some teachers teach remotely from different places. We organize alumni seminars where former students talk about their careers after the ToxMaster, in Sweden, Europe and beyond. In the course Health risk assessment the main focus is on the European legislations, but international/global aspects are also included.

**Exchange studies and teacher exchange**
Some students at the ToxMaster programme (2-6 per year) go on exchange studies during the Degree project course. By collaboration with the KI Biomedicine programmes the ToxMatser can offer students exchange agreements with 13 universities in Europe, Canada, Singapore, Japan and Saudiarabia. Some students also choose to do their master project in another country as a free-mover. All students get information about possibilities to study abroad. The international coordinator for exchange studies informs the students at an online webinar together with the course director for the degree project course and the students can get answers to all kinds of questions. They also get individual support from the coordinator throughout the process, as well as when they are abroad.

The course directors on the programme have not participated in formal teacher exchange, although exchange is possible and encouraged. The reason is primarily lack of time. However, two course directors have, within a collaboration supported by the Swedish Foundation for International Cooperation in Research and Higher Education (STINT), been teaching in Brazil (2022) and invited Brazilian colleagues to teach at an online workshop for students in the first course (2021), illustrating global toxicology issues in the area of air pollution.

Teachers at the programme are very active in developing and arranging courses in the field of risk assessment. Several EU-projects have focused on collaborative projects with partners in many European countries. These courses have mainly been given to researchers and professionals, but some have been given jointly also for ToxMaster students and have contributed to the development of courses in this area within the ToxMaster programme.

**External teachers**
Some courses invite external teachers from other countries to give guest lectures. One example is an expert from the European Chemicals Agency (ECHA), Helsinki, Finland, on the use of computer-based methods for regulatory risk assessment. This is a great opportunity for the students to listen to and discuss with one of very few experts in the field.

**Exit poll**
The following results from the Exit poll from 2023 show that the graduating ToxMaster students felt well-prepared to work in a global arena with multicultural colleagues (Table 12). In the exit poll one student commented: "*International and multidisciplinary environment, helped me broaden my perspectives and knowledge on different topics*".

**Table 12.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| I feel well-prepared for my future role's requirements to: **cooperate in diverse cultural environments** | 5.4* | 5.5 |
| **apply a global health perspective** on a variety of issues | 5.4 | 5.0 |
| have a **broad understanding of international events shaping the world** | 5.2 | 4.8 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

**Meeting with students and alumni**
A meeting was arranged to get input from current students and recent alumni. Sixteen students at the first and second years, and alumni discussed: *Does the teaching environment promote a safe and open environment /psychological safety (in class, with other students (in groups), with teachers)? Do you achieve sufficient intercultural competence?* Both students and alumni agreed that the teaching environment and general class environment is safe, open and respectful and they felt comfortable speaking up whenever issues came up. They also felt supported by teachers whenever there were any issues that needed to be addressed. The smaller class and many group works allowed them to get to know each other and learn how to communicate with each other effectively. They suggested a workshop about discrimination/harassment and intercultural communication at the start of the programme to promote psychological safety. They got to know how different cultures can collaborate and work and that the group dynamics seminars were very helpful. They also reported that sometimes there was a language barrier which made communication more difficult and caused misunderstandings.

Several course directors at the programme have taken the course "*Teaching in the Glocal university*", where aspects, such as internationalisation, intercultural competence and communication, teaching in English, global health for global engagement and teaching, learning and assessment in the international university are discussed.

**Analysis and evaluation**
The ToxMaster students appreciate the safe environment in class and the opportunities to develop cultural competence. They have many possibilities to interact with students and teachers from different countries and cultures. The students feel well-prepared to work on a global arena with multicultural colleagues. ToxMaster alumni work in many parts of the world although many stay in Sweden or northern Europe.

Students want even more workshops and activities focusing on discrimination and harassment, as well as on intercultural communication. The programme plans to add more interactive activities, especially in the beginning of the programme, as well as in courses with major group assignments. Students and alumni would like more international perspectives, beyond Europe, also in the risk assessment course. The course director is considering what and how to include such perspectives.

**Strengths**

- Students appreciate the safe environment in class and the opportunities to develop cultural competence.
- The students have many possibilities to interact with students, teachers and others from different countries and cultures.
- The students feel well-prepared to work on a global arena with multicultural colleagues. ToxMaster alumni work in many parts of the world although many stay in Sweden or northern Europe.

**Challenges**

- Students want even more workshops and activities focusing on discrimination and harassment, as well as on intercultural communication. The programme will discuss how to add more interactive activities.
- Students/alumni would like broader international perspectives, beyond Europe. The course directors are considering what is most relevant, and how and where to include such perspectives.

## Assessment panel's evaluation

| **Instruction** |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths:** The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement:** The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet*. |
| **Strengths:**<br>• From the self-evaluation it seems clear that students appreciate the safe environment in class and the opportunities to develop cultural competence.<br>• It seems clear that the students have many possibilities to interact with students, teachers and others from different countries and cultures.<br>• The Exit Poll 2023 showed that the graduated students feel well-prepared to work on a global arena with multicultural colleagues. ToxMaster alumni work in many parts of the world although many stay in Sweden or northern Europe. |

**Areas for improvement:**

- Students want even more workshops and activities focusing on discrimination and harassment, as well as on intercultural communication. The program will discuss how to add more interactive activities.
- Students/alumni would like broader international perspectives, beyond Europe. The course directors are considering what is most relevant, and how and where to include such perspectives.
- ToxMaster alumni work in many parts of the world although many stay in Sweden or northern Europe. The expert panel would have liked to get more detailed statistics regarding where the graduated students get jobs: authorities, industry, academia etc. How many of them are getting a position as a toxicologist in Sweden? How many start up a PhD? Unfortunately, these questions could not be fully clarified during the interviews due to lack of detailed statistics.

**Evaluation:**

Overall, it is the evaluation that the program meets the requirements of the assessment criterion, but we note that students and alumni would like more international perspectives, beyond Europe, also in the risk assessment course.

## 4.3 Assessment criterion: Interprofessional competence

Interprofessional competence is part of the generic competence that is necessary for employees, not only in current and future health and medical care, but also in other areas of employment relevant to KI's education. KI's vision is that the education is designed and implemented in such a way that the student, after completing the education, has the best possible conditions to work within and continuously develop an activity in close collaboration with other professions and disciplines. Intended learning outcomes and educational activities to achieve interprofessional knowledge, competence and approach must therefore be included and assessed within KI's programmes at first and second cycle.

Interprofessional competencies include: Communication, collaboration, teamwork, roles and responsibilities, conflict resolution, patient safety and patient/client centeredness.

**Assessment criterion: Interprofessional competence**

The programme is designed and carried out in such a way that it develops the student's competence to work within and continuously develop an activity in close collaboration with other professions and disciplines.

Describe, analyse, and evaluate. Outline the strengths and challenges, as well as how these are addressed to ensure high quality in the programme. Illustrate with examples. The description should be between 1-3 pages, using font size 11 and single line spacing.

## Programme description

The ToxMaster programme focuses a lot on training the students' skills in communication, collaboration, teamwork, including also clarifying roles and responsibilities, and prevention and handling of potential conflicts. There are many group assignments in almost all courses of the programme, some shorter and simpler and others longer and more advanced. In many of these assignments students are assigned a specific professional role or use their previous knowledge, in for example chemistry, biology, pharmacology or medicine.

**Self-awareness and group dynamics**

The teaching about self-awareness and group development was introduced five years ago, as a set of four workshops during the program. The teaching aims to improve the students' ability to cooperate with others in groups, during the program's many group works, but also in their future career after graduation. There is a lot of focus on diversity, that we are different as individuals, have different cultural backgrounds, knowledge, experiences and behaviors. Some individuals are more introverted and others more extroverted, some are more task-oriented and others more people-oriented. The teacher emphasizes that diversity is a strength when working in groups and people can complement each other. However, it may also be challenging to understand, and being able to communicate effectively with each other. We aim at students to learn to understand different perspectives and to communicate and collaborate openly, respectfully and constructively. Students learn how to promote positive group development to a healthy and efficient team that can deal successfully with complex tasks. We also work on promoting psychological safety as a prerequisite for working well together and learn efficiently. Emphasis is also put on these aspects to prevent discrimination or harassment. On the third semester, we have a learning objective linked to this subject "*To reflect on one's own and others' behavior and professionalism in group situations, based on self-awareness and knowledge of group dynamics*" that is examined by an individual reflection after a long and advanced group task where the student groups take on different professional roles (further described below) and collaborate both within and between groups. During the degree project, we discuss more concretely "Critical success factors" in connection with the students entering a new group. They also make an Action Plan for how to ensure good communication, with supervisors and others, and increase the possibilities for a successful degree project.

**Toxicology is multidisciplinary**

Toxicology is a multidisciplinary subject where many areas of expertise are needed in order to for example draw conclusions from a toxicity test or perform a risk assessment. It is not possible for a single toxicologist to have the broad and deep knowledge and skills required. Therefore, most toxicologists work in teams where the members have different competence profiles and with their complementary skills perform common tasks. To be able to work well and efficiently together it is important that everyone have enough basic knowledge and insights into each other's area of expertise to understand how to discuss common aspects and collaborate efficiently. During the ToxMaster programme the students are trained in many different areas and methodologies at a more basic level, than for experts in these fields, to be able to collaborate and communicate with such experts. Examples of such areas (where the toxicologists usually not have expertise themselves) are: pathology, toxicokinetics, analytical chemistry, computer-based models, animal handling and toxicity testing. Students are trained for this working-life scenario during a 10 credit long course "Regulatory toxicity testing" on the third semester where the students in groups take

on the role as “expert” in six different areas relevant to toxicity testing in animals (animal handling, bioanalysis, toxicokinetics, clinical pathology, pathology and quality assurance) and should collaborate effectively with the other groups in order to draw joint conclusions about the toxicity in a real-life case. They are provided with a study plan, standard operating procedures and raw data and should write a joint report. This course thus mimics the real-life situation in toxicity testing where many toxicologists work and students are trained by tutors that are experts in the respective areas/professions.

**Interprofessional aspects within courses**
In the second semester the ToxMaster students participate in a joint workshop “*Getting down to business*” developed and organised together with the Masters’ programmes in Biomedicine and Bioentrepreneurship. The students discuss different aspects related to drug development (perspectives from an academic researcher performing studies for a company, perspectives from the start-up company and wider discussions about risk-benefit considerations, European regulations for drug development and business aspects on requirements to further fund a project). The students discuss in mixed groups where they represent their own “profession”, e.g. the toxicologist. The questions relate to both scientific, ethical, legal and business aspects on a given case. The groups write reflections and the questions are discussed further in plenum. This workshop is highly appreciated by both students and teachers. It clearly prepares students to work with other professions in the area of drug development.

The ToxMaster students take a full 4.5 credit course together with the master students in biomedicine. The course “*Laboratory Animal Science – in theory and practise*” on the 2nd semester includes hands-on training where the students work in small, mixed groups with other students with a similar level of experience of laboratory animals. In addition, the students (also in mixed groups) work on a scientific project where they design a study involving animals and present it orally as an ethical application taking on the role as the study director/PI. The presentations are followed by a discussion and feedback from other groups and teachers. During this course the Tox students get insights into another discipline/profession and students learn from each other.

At several study visits during the programme the students come into contact with professional toxicologists, but also other professions working at the hosting sites. Two examples are the Swedish Food Agency and the European Food Safety Authority where many employees are nutritionists. At the Summer schools on alternatives to animal studies organized by the European Commission Joint Research Centre (described in the section on Working life and collaboration) the ToxMaster students meet and interact with other participants, mainly junior biomedical scientists (PhD students and postdocs) with the common interest in development of non-animal models to replace and reduce studies on laboratory animals.

**Exit poll**
The following results from the Exit poll from 2023 show that the graduating ToxMaster students felt well-prepared to work interprofessionally (Table 13).

**Table 13.** Results of ToxMaster Exit poll 2023 compared to the average result of KI international master programmes.

| Question | ToxMaster | KI masters |
|---|---|---|
| I feel well-prepared for my future role’s requirements to: | 5.2* | 5.0 |

| | | |
|---|---|---|
| **work with other professions** | | |
| **cooperate in interprofessional teams** | 5.3 | 5.3 |

* Answer range 1 (to a very small degree) to 6 (to a very high degree)

**Analysis and evaluation**
Although aiming at educating toxicologists the programme is designed and implemented in such a way that the students at several occasions work in interprofessional teams or take on roles of a specific discipline to collaborate with other groups of students studying other subjects.

At graduation the students feel well-prepared to work interprofessionally and have the basic knowledge and skills to continuously collaborate and develop in close collaboration with other professions and disciplines of relevance to toxicology. It was recognised that the programme has no ILO on professional competence (although it is taught in several courses). The need for such an ILO will be discussed in the processes to develop a new curriculum.

Collaboration and communication is important, but difficult and therefore students are trained in these skills throughout the programme.

**Strengths**
- Students have different educational backgrounds which is used in group work, they get different professional roles and collaborate between disciplines to perform a common task, they also work together with students with other “professions” in a joint workshop, a course and a Summer school.
- Students feel well-prepared to work interprofessionally.

**Challenges**
- It is challenging to collaborate and communicate with other professions when you do not know their field or terminology. This is practiced with relevant professions during the programme and students learn both about other professions and how to communicate and collaborate in interprofessional settings.
- There is no ILO on interprofessional competence, but the need will be discussed and considered.

## Assessment panel's evaluation

| Instruction |
| --- |
| For each assessment criterion, the assessment panel should describe their evaluation under the following three headings below:<br><br>**Under the heading Strengths**: The assessment panel should highlight the programme's strengths within the assessment criterion and briefly describe them, preferably in bullet points.<br><br>**Under the heading Areas for improvement**: The assessment panel should identify areas that are assessed to need improvement and briefly describe them, preferably in bullet points.<br><br>**Under the heading Evaluation:** The assessment panel should explain their assessment and motivate their conclusion. The evaluation should be specified in one of four levels of fulfilment: *Meets/Meets to a large extent/Meets to some extent/Does not meet*. |
| **Strengths:**<br>• Students have different educational backgrounds which is used in group work, they get different professional roles and collaborate between disciplines to perform a common task, they also work together with students with other "professions" in a joint workshop, a course, and a summer school.<br>• Students feel well-prepared to work interprofessional.<br><br>**Areas for improvement:**<br>• As stated in the self-evaluation, it is challenging to collaborate and communicate with other professions when you do not know their field or terminology. This should be practiced more with relevant professions during the program and students learn both about other professions and how to communicate and collaborate in interprofessional settings.<br>• There is apparently no ILO on interprofessional competence (although it is taught in several courses), but it is stated in the self-evaluation that the need for such specific ILO will be discussed and considered by the program.<br><br>**Evaluation:**<br>Overall, it is the evaluation that the program meets the requirements of the assessment criterion. The justification for that evaluation is the results of ToxMaster Exit poll 2023, showing that the graduating ToxMaster students felt well-prepared to work with other professions and cooperate in interprofessional teams (on average 5.2 and 5.3 of 6). |

## Other aspects

The programme can describe areas that are relevant to highlight but are not included in any of the assessment criterion, such as other generic competencies and forward-looking development work to increase the quality of the programme. Scope 1-3 pages with font size 11 points and single line spacing.

**Programme description of other aspects:**

**Revision of the programme curriculum and syllabus**
The current programme curriculum and syllabus was implemented in 2015, involving a major revision of the content and order of the courses, as well as introducing two parallel elective courses where students can specialize in an area of their interest. In 2022 an analysis of the current curriculum started to be discussed among course directors in the light of the future needs of society, students' interests and teachers' competence. A new programme curriculum and syllabus is planned to be implemented in the autumn 2026 when the current Programme director retires.

The current process of self-evaluation, as well as the results of the external programme evaluation will be very valuable for the development of the new curriculum.

## The assessment panel's reflection

| **Instruction** |
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| Under the heading *Reflection*, the assessment panel shall present the assessment panel's reflections on the programme's description of other aspects. |
| **Reflection:**<br>The current program curriculum and syllabus were implemented in 2015, involving a major revision of the content and order of the courses, as well as introducing two parallel elective courses where students can specialize in an area of their interest. In 2022 an analysis of the current curriculum started to be discussed among course directors in the light of the future needs of society, students' interests, and teachers' competence. A new program curriculum and syllabus is planned to be implemented in the autumn 2026 when the current program director retires. The evaluation committee appreciates that the program and course curricula (and other program-related matters) seem to be discussed every year by the program director and course leaders (or maybe every semester) probably leading to various updates of the program. |

# Summary of the assessment panel

| Instruction |
| --- |
| The assessment panel's summary should begin with a reflection on the conditions provided by the self-evaluation to assess the quality of the programme, i.e. whether the self-evaluation was easy to read, well-structured, provided answers to the questions asked and followed the instructions. The summary should also briefly summarize the program's key strengths and areas for improvement. The assessment panel can also add other points of view that the assessment panel wishes to present. |

First: Those who wrote the self-evaluation about the international master program in toxicology at KI, did a very good job, making the work for us in the expert panel relatively easy.

**The report:**

- Was easy to read.
- Was well-structured.
- Provided answers to the questions asked (especially after the interviews)
- Followed the instructions even if the text was predominantly descriptive. The sections about the various Assessment criteria, in most cases also included wise reflections.
- Was able to clearly communicate the program's key strengths.

**In our opinion, the three most important challenges and/or improvements for the next generation of the ToxMaster program would be:**

- In the long-term perspective: The availability of competent teachers covering the broad areas of toxicology is a major challenge in the light of retirements, risk of course directors leaving the program or IMM, as well as the vulnerability of relying on external teachers for some areas.
- In the long-term perspective: Uncertain if future students will be able to perform wet labs at IMM to the same extent as today. A master program in toxicology must include wet labs, so if the program fails to convince IMM researchers and the head of department about the necessity of wet labs in house – the future for the MasterTox program will probably be jeopardized.
- The progression during the whole program is not very clear in the ILOs for the different courses. These should therefore be revised in the coming revisions of the course syllabi.

**To conclude:**

The quality of the program's self-evaluation was very high, and we in the assessment panel all agreed that it passed with distinction.